1- Choose the correct answer in each of the following.

1- $2 \sin 30^0 \cos 30^0 =$ ……….

a) $\sin 60^0$

b) $\cos 60^0$

c) $\tan 60^0$

d) $2 \sin 60^0$

2- The points (-3, 0), (0, 3), (3 ,0) are the vertices of …………

a) a scalene triangle

b) an equilateral triangle

c) an obtuse-angled triangle

d) a right-angled triangle and isosceles

3- The equation of the straight line which passes through the point (2, -3), parallel to X-axis is …………

a) $X = -2$

b) $Y = -3$

c) $X = 2$

d) $Y = 3$

4- If the straight line whose equation: $X + 3Y - 6 = 0$ is perpendicular to the straight line whose equation: $a X - 3y + 7 = 0$, then a = ……

a) 2

b) 9

c) -9

d) -2

5- If the point (0, 4) is the midpoint of the distance between the two points (-1, -1), (X, Y), then the point (X, Y) is ……….

a) (1 ,9)

b) (-1, 9)

c) $(-\frac{1}{2}, \frac{3}{2})$

d) (-1 ,3)

6- In Δ ABC, if m (< B) = 90^0, AB = 3 cm, BC = 4 cm, then sin A cos C = …………

a) 1

b) $\frac{9}{25}$

c) $\frac{12}{25}$

d) $\frac{16}{25}$

7- The distance between the two points (-4 ,0) and (0, -3) is ……. Length unit

a) -1

b) -7

c) 5

d) 12

8- Cos (X + 50^0) = $\frac{1}{2}$, where X is the measure of an acute angle, then X = ………0

a) 5

b) 10

c) 25

d) 30

9- If: A = (1, 3), B = (3, -5), then the coordinates of the midpoints of $\overline{AB}$ is ………….

a) (2 ,0)

b) (2, 4)

c) (2, -1)

d) (-2 ,1)

10- $4 \cos 30^0 \tan 60^0 =$ ……….

a) $2\sqrt{3}$

b) 3

c) 6

d) 12

11- In the perpendicular axis coordinate plane, the point which the distance between it and the origin point equals 2 length unit can be………….

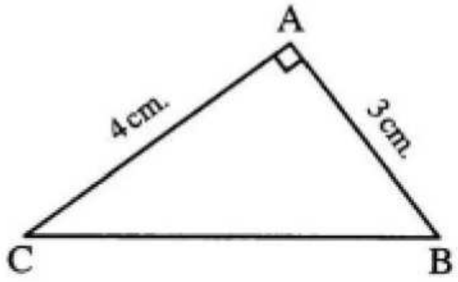
a) $(1 , \sqrt{3})$

b) (2, 1)

c) (0 ,2)

d) (-3 ,5)

12- In the opposite figure: Sin B + cos C = …….



a) 1

b) $\frac{8}{5}$

c) $\frac{6}{5}$

d) Zero

13- $\sin 60^0 + \cos 30^0 + \tan 60^0 =$ ……….

a) $2\sqrt{3}$

b) $3\sqrt{3}$

c) $\frac{\sqrt{3}}{2}$

d) $\frac{2}{\sqrt{3}}$

14- If: $\tan (X + 5^0) = 1$, where X is the measure of an acute angle , then X = ………^{0}

a) 45^0

b) 25^0

c) 40^0

d) 30^0

15- The midpoints of $\overline{AB}$ where A (6 ,1) and B (-2, 3) is the point ………

a) (4 ,2)

b) (2, 2)

c) (4, 4)

d) (8 ,4)

16- The distance between the point $(5, \tan^2 60^0)$ and the X-axis = ………… length unit

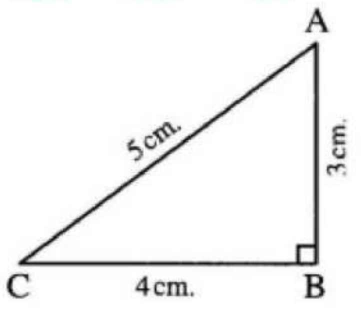
a) 5

b) $\sqrt{3}$

c) $\sqrt{5}$

d) 3

17- In the opposite figure: tan C = …………



a) $\frac{3}{5}$

b) $\frac{4}{3}$

c) $\frac{4}{5}$

d) $\frac{3}{4}$

18- The distance between the two points $(0, \tan^2 60^0)$ and $(8 \sin 30^0, 0)$ equals …………... length unit

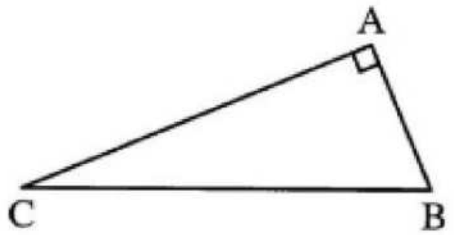
a) 1

b) 3

c) 4

d) 5

19- In the opposite figure: Sin C =…………



a) sin B

b) cos B

c) tan C

d) cos C

20- If: 2 sin X = tan 60^0, where X is the measure of an acute angle, then X = ………0

e) 15^0

f) 30^0

g) 60^0

h) 45^0

21- If: tan 2 X =$\frac{\sqrt{3}}{3}$, where X is the measure of an acute angle, then X = ……^{0}

a) 15^0

b) 30^0

c) 60^0

d) 45^0

22- If: C (2, 1) is the midpoint of $\overline{AB}$ where B (3 ,0), then A is …….

a) (1 ,2)

b) (2, 1)

c) (5 ,1)

d) (1 ,5)

23- If: cos 2X = $\frac{1}{2}$, where X is the measure of an acute angle, then m (< X) = ………^{0}

a) 15

b) 30

c) 45

d) 60

24- The slope of the straight line whose equation: $2X - 3Y + 5 = 0$ equals …………….

a) $-\frac{3}{2}$

b) $-\frac{2}{3}$

c) $\frac{2}{3}$

d) $\frac{3}{2}$

25- In the Δ ABC, if m (< B) = 90^0, then sin A + cos C = ………….

a) 2 sin A

b) 2 sin C

c) 2 sin B

d) 2 cos A

26- A circle of center at the origin point and its radius length is 2 length units, which of the following points belongs to the circle

a) (1,-2)

b) $(-2,\sqrt{5})$

c) $(\sqrt{3}, 1)$

d) (0, 1)

27- The perpendicular distance between the two straight lines: $x - 2 = 0$, $x + 3 = 0$ equals ………………units.

a) 1

b) 5

c) 2

d) 3

28- The equation of the straight line pass through the point (2,3) and is parallel to x-axis is …………..

a) $x = 2$

b) $x = 3$

c) $y = 2$

d) $y = 3$

29- The equation of the straight-line pass through the point (-5, 3) and is parallel to y-axis is …………..

a) $x = -5$

b) $x = 3$

c) $y = 2$

d) $y = -5$

30- The distance between the point (-4,3)and y-axis equals …….length units

a) -3

b) -4

c) 3

d) 4

31- The number of sides of the regular polygon in which the measure of one of its interior angles is 144° equals ……sides.

a) 7

b) 8

c) 9

d) 10

32- The measure of the interior angle of a regular hexagon =………

a) $720°$

b) $360°$

c) $180°$

d) $120°$

33- An isosceles triangle, the length of its sides may be 4cm, 9cm… cm

a) 4

b) 9

c) 13

d) 36

34- If 3, 7, l are the lengths of the sides of a triangle, then l can be equal to ……………..

a) 3

b) 4

c) 7

d) 10

35- The image of the point (-3, 5) by reflection on y-axis is …………….

a) (3, 5)

b) (5, 3)

c) (-5, 3)

d) (-3, - 5)

36- The image of the point (4, 5) by translation (2, 3) is …………

a) (6,-8)

b) (-8, 6)

c) (6, 8)

d) (-6,-8)

37- ABC is a triangle,$m(\angle A) = 85°$,$\sin B = \cos B$, then $m(\angle C) =$ ....

a) 30°

b) 45°

c) 50°

d) 60°

38- The area of the triangle bounded by the straight line $x = 0$, $y = 0$, $3x + 2y = 12$equals …………..square units.

a) 6

b) 12

c) 4

d) 5

39- The slope of straight line $x - 5 = 0$ is ……….

a) 5

b) $\frac{1}{5}$

c) Undefined

d) zero

40- The point of concurrence of the medians of the triangle divides each median in the ratio of ……….from the base.

a) 2:3

b) 2:1

c) 1:2

d) 3:2

41- If $C \in$ the axis of symmetry of $\overline{AB}$, then CA……….CB

a) $\perp$

b) <

c) >

d) =

42- If $L_1 \perp L_2$ and $L_3 \perp L_2$ then $l_1 \dots \dots l_3$

a) $\perp$

b) //

c) =

d) <

2- ABCD is a quadrilateral in which A (3 ,3), B (1, -1), C (-3, -3) and D (-1 ,1), **prove that:** ABCD is a rhombus and find its area.

3- If the distance between the point (a, 7) and the point (0, 3) equal 5 length unit find the value of a.

4- prove that: The points A (2 ,3), B (3, 4) and C (5, 6) are collinear

5- Prove that: the triangle whose vertices A (1, -2), B (-4 ,2) and C (1 ,6) is isosceles.

6- Prove that: The points A (4 ,0), B (4 ,5) and C (-2 ,5) are the vertices of a right-angled triangle and find its area.

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7- ABCD is a quadrilateral where A (-1 ,1), B (0, 5), C (5 ,6) and D (4 ,2) prove that: ABCD is a parallelogram

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8- $\overline{AB}$ is a diameter in the circle M where A (-6, -8) and B (6 ,8), determine the coordinates of the Centre of this circle (M) and its circumference?

$(\pi = 3.14)$

9- ABCD is a parallelogram, its diagonals intersect at E, if A (3, -1), B (6 ,2) , C (1 ,5), then **find:**

First: the coordinates of E, D   **second**: the length of $\overline{DE}$

10- Prove that : the points A(3,-1),B(-4,6) and C(2,-2) which belongs to a perpendicular coordinates plane passing through the circle whose Centre is the point M(-1,2) ,then find the area and circumference.

11- ABC is a right-angled triangle at B , $\overline{BD}$ is a median in it , find the coordinates of D and the length of $\overline{BD}$ knowing that A (10 , 14) , C (4 ,6)

12- Find the equation of the straight line passes through the point (2, -1) and parallel to the straight line : $2X - Y + 5 = 0$

13- Find the slope and intercepted part of Y-axis of the straight line whose equation : $\frac{x}{2} + \frac{y}{3} = 1$

14- Find the equation of the straight line which passes through the point (1, 6) and the midpoint of $\overline{AB}$, where A (1 , -2) , B (3 ,-4)

15- If: A (-1,-1), B (2, 3) and C (6, 0):

Prove that: Δ ABC is a right-angled at B

Find: the area of Δ ABC

Find: sin A and tan C

16- Find the equation of the straight line passes through the point (2 -1) and parallel to the straight line: $2X - Y + 5 = 0$

17- Find the equation of the straight line which passes through the point (3, 4) and perpendicular to the straight line: $5X - 2Y + 7 = 0$

18- ABC is a right-angled triangle at B , $AB = 15$ cm , $BC = 20$ cm , prove that: $\cos C \cos A - \sin C \sin A =$ zero

19- If $\sin x = \sin 30° \cos 30° + \cos 60° \sin 60°$, without using the calculator, find x where X is the measure of an acute angle.

20- If the ratio between the measures of the interior angles of the triangle is 2: 5: 6 find the measure of each angle in degrees.

21- ABC is a right-angled triangle at B, $m(\angle C) = 40°$ and $AC = 12$ cm, then find the length of $\overline{AB}$ to the nearest cm.

22- ABC is a triangle, $AB = AC$, $BC = 16$ cm and $\cos B = \frac{4}{5}$, then find the surface area of the triangle ABC.

23- ABC is a right-angled triangle at B, $2\,AB = \sqrt{3}\,AC$, find the trigonometrical ratios of $\angle C$.

24- ABCD is a trapezium in which $\overline{AD} // \overline{BC}$, m $(< B) = 90^0$, if AB = 3 cm, AD = 6 cm, BC = 10 cm, prove that: $\cos(\angle DCB) - \tan(\angle ACB) = \frac{1}{2}$

25- If the straight line whose equation is $ax + 2y - 7 = 0$ is parallel to the straight line which makes an angle of measure 45° with the positive direction of x-axis, find the value of a.

26- ABCD is an isosceles trapezium, its area= $36cm^2$,$\overline{AD}//\overline{BC}$, AD=6cm.and BC=12cm.

Find the value of: $\sin B + \cos C$

27- Find the equation of the straight line whose slope is equal to the slope of straight line $\frac{y-1}{x} = \frac{1}{3}$ and intercepts a negative part from the y-axis that is equal to 3 units.

28- ABCD is a trapezoid, $\overline{AB}//\overline{CD}$,A(9,-2),B(3,2),C(x,-x),D(4,-3), Find the coordinates of the point C.

29- Find the equation of the axis of symmetry of $\overline{AB}$ where A (-3,5) and B(1,3).

30- If C is the midpoint of $\overline{AB}$ where A (x, -6) , B(9,-12) and C(-3,y), Find the value of x, y.

31- If $\overleftrightarrow{AB}$// the $y-$axis where A(x, 7), B (3, 5), find the value of x.

With my best wishes

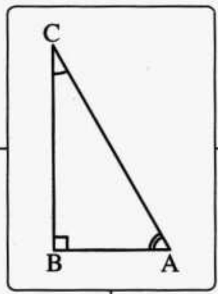
Geometry – Final Revision – Rules

First Trigonometry

Remember: The main trigonometrical ratios of the acute angle and the important relations between them

The trigonometrical ratios of the angle A

- $\sin A = \dfrac{\text{Opposite}}{\text{Hypotenuse}} = \dfrac{BC}{AC}$
- $\cos A = \dfrac{\text{Adjacent}}{\text{Hypotenuse}} = \dfrac{AB}{AC}$
- $\tan A = \dfrac{\text{Opposite}}{\text{Adjacent}} = \dfrac{BC}{AB}$



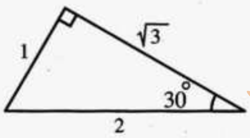
The trigonometrical ratios of the angle C

- $\sin C = \dfrac{\text{Opposite}}{\text{Hypotenuse}} = \dfrac{AB}{AC}$
- $\cos C = \dfrac{\text{Adjacent}}{\text{Hypotenuse}} = \dfrac{BC}{AC}$
- $\tan C = \dfrac{\text{Opposite}}{\text{Adjacent}} = \dfrac{AB}{BC}$

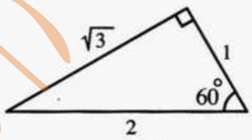
Some important relations

- $\tan A = \dfrac{\sin A}{\cos A}$
- If $m(\angle A) + m(\angle C) = 90°$, then $\sin A = \cos C$, $\cos A = \sin C$
- If $\sin A = \cos C$ or $\cos A = \sin C$, then $m(\angle A) + m(\angle C) = 90°$

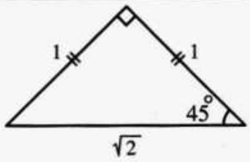
Remember: The trigonometrical ratios of some angles



- $\sin 30° = \dfrac{1}{2}$
- $\cos 30° = \dfrac{\sqrt{3}}{2}$
- $\tan 30° = \dfrac{1}{\sqrt{3}}$



- $\sin 60° = \dfrac{\sqrt{3}}{2}$
- $\cos 60° = \dfrac{1}{2}$
- $\tan 60° = \sqrt{3}$



- $\sin 45° = \dfrac{1}{\sqrt{2}}$
- $\cos 45° = \dfrac{1}{\sqrt{2}}$
- $\tan 45° = 1$

Notice that

If $\cos \theta = 0.7152$, then we use the calculator to find θ by using the keys as the following sequence from left : shift cos · 7 1 5 2 = °'''

Then $\theta \simeq 44° \, 20' \, 25''$

Second: Analytical geometry

Remember: The important laws

If $A(x_1, y_1)$, $B(x_2, y_2)$

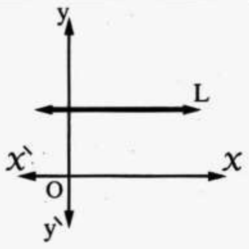
- The law of the distance between the two point A , B (the length of $\overline{AB}$) :
  $AB = \sqrt{(\text{difference between } x-\text{coordinates})^2 + (\text{difference between } y-\text{coordinates})^2}$
- The law of finding the coordinates of the midpoint of $\overline{AB}$:
  The midpoint of $\overline{AB} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$
- The law of finding the slope of the straight line $\overleftrightarrow{AB}$:
  $m = \frac{y_2 - y_1}{x_2 - x_1}$

Remember: How to find the slope of the straight line

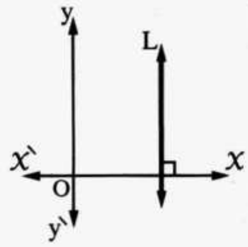
1	Given two points on the line as : $A(x_1, y_1)$, $B(x_2, y_2)$	$m = \frac{y_2 - y_1}{x_2 - x_1}$
2	Given the measure of the positive angle which the straight line makes with the positive direction of x-axis , say θ	$m = \tan\theta$
3	Given the equation of the straight line in the form : $y = b\,x + c$	$m = b$ where b is the coefficient of x
4	Given the equation of the straight line in the form : $a\,x + b\,y + c = 0$	$m = \frac{-\text{coefficient of } x}{\text{coefficient of } y} = \frac{-a}{b}$
5	Given the slope of the parallel straight line to it , say m_1	$m = m_1$ because the two slopes are equal.
6	Given the slope of the perpendicular straight line to it , say m_2	$m = \frac{-1}{m_2}$ because : $m \times m_2 = -1$

Important remarks on the slope of the straight line

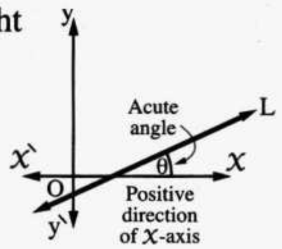
- The slope of x-axis $= 0$
- The slope of the straight line parallel to x-axis equals 0



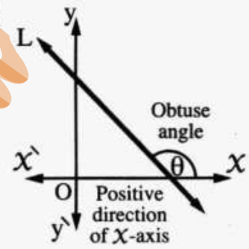
- The slope of y-axis is undefined.
- The slope of the straight line parallel to y-axis is undefined.



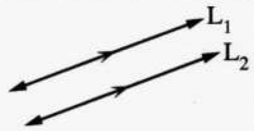
- The slope of the straight line which makes an acue angle with the positive direction of x-axis is positive.



- The slope of the straight line which makes an obtuse angle with the positive direction of x-axis is negative.

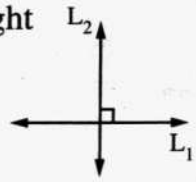


- The two parallel straight lines their slopes are equal.



i.e. If $L_1 // L_2$, then $m_1 = m_2$

- The two perpendicular straight lines the product of their slopes equals -1

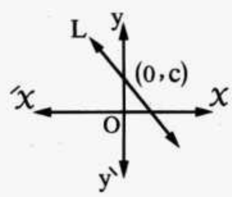


i.e. If $L_1 \perp L_2$, then $m_1 \times m_2 = -1$

Remember — The equation of the straight line

- The equation of the straight line whose slope = m and cuts y-axis at the point (0 , c) is :

$y = m x + c$



For example :

- The equation of the straight line whose

Slope is -2 and cuts from the positive part of y-axis 7 units is : $y = -2x + 7$

- To find the equation of the striaght line whose slope is 3 and passes through the point $(1 , -2)$:

$\because$ The slope = 3 $\qquad\qquad$ $\therefore$ The equation of the straight line is : $y = 3x + c$

, then substitute by the point $(1 , -2)$ to find the value of c as the following :

$-2 = 3 \times 1 + c$ $\qquad\qquad$, then : $c = -5$

$\therefore$ The equation of the straight line is : $y = 3x - 5$

Important remarks on the equation of the straight line

❶ The equation of the straight line which passes through the origin point O (0 , 0) is : $y = m\,x$ where m is the slope.

❷ The equation of x-axis is : $y = 0$ and the equation of y-axis is : $x = 0$

❸ The equation of the straight line parallel to x-axis and cuts y-axis at the point (0 , c) is : $y = c$

❹ The equation of the straight line parallel to y-axis and cuts x-axis at the point (a , 0) is : $x = a$

Remember — Some rules and remarks which help you to solve the exercises

❶ To prove that the points A , B and C are collinear

We will prove that :

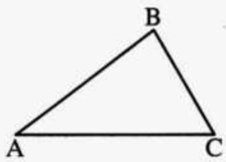
• The slope of $\overleftrightarrow{AB}$ = the slope of $\overleftrightarrow{BC}$ **or** • AB + BC = AC (where AC is the greatest length)

❷ To prove that the points A , B and C are vertices of a triangle

We prove that :

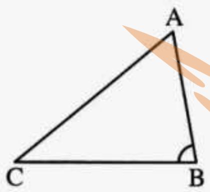
• The slope of $\overleftrightarrow{AB} \neq$ the slope of $\overleftrightarrow{BC}$

or • AB + BC > AC (where AC is the greatest length)



❸ To determine the type of the triangle ABC according to its angle measures

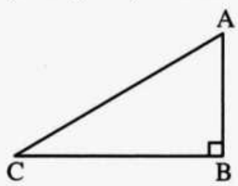
We compare between : $(AC)^2$, $(AB)^2 + (BC)^2$ where $\overline{AC}$ is the longest side , if :



$(AC)^2 < (AB)^2 + (BC)^2$

, then :

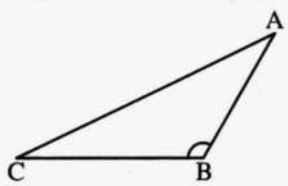
Δ ABC is acute-angled.



$(AC)^2 = (AB)^2 + (BC)^2$

, then :

Δ ABC is right-angled at B



$(AC)^2 > (AB)^2 + (BC)^2$

, then :

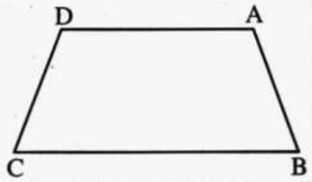
Δ ABC is obtuse-angled at B

4 To prove that : the quadrilateral ABCD is a trapezium

We prove that :

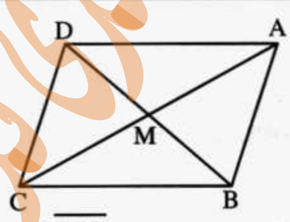
The slope of $\overleftrightarrow{AD}$ = the slope of $\overleftrightarrow{BC}$, then $\overline{AD} \parallel \overline{BC}$

, the slope of $\overleftrightarrow{AB} \neq$ the slope of $\overleftrightarrow{DC}$, then $\overline{AB}$ is not parallel to $\overline{DC}$



5 To prove that : the quadrilateral ABCD is a parallelogram

- **By using the slope , we prove that :**
  The slope of $\overleftrightarrow{AD}$ = the slope of $\overleftrightarrow{BC}$, then $\overline{AD} \parallel \overline{BC}$
  , the slope of $\overleftrightarrow{AB}$ = the slope of $\overleftrightarrow{DC}$, then $\overline{AB} \parallel \overline{DC}$
- **By using the distance between two points , we prove that :**
  The length of $\overline{AD}$ = the length of $\overline{BC}$, the length of $\overline{AB}$ = the length of $\overline{DC}$
- **By using the coordinates of the midpoint of a line segment , we prove that :**
  The coordinates of the midpoint of $\overline{AC}$ is the coordinates of the midpoint of $\overline{BD}$,
  then : $\overline{AC}$, $\overline{BD}$ bisect each other.



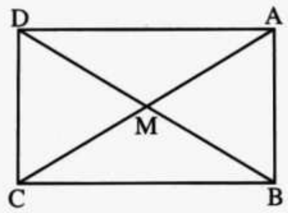
6 To prove that : the quadrilateral ABCD is a rectangle

First we prove that : the quadrilateral ABCD is a parallogram by one of the previous methods , then

prove that :

- AC = BD (By using the distance between two points)

or • The slope of $\overleftrightarrow{AB}$ × the slope of $\overleftrightarrow{BC} = -1$, then : $\overline{AB} \perp \overline{BC}$



7 To prove that : the quadrilateral ABCD is a rhombus

* First we prove that : the quadrilateral ABCD is a parallelogram , then

Prove that :

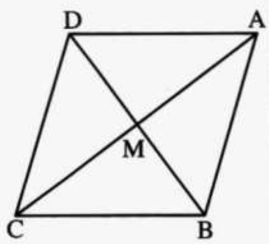
- AB = BC (By using the distance between two points)

or • The slope of $\overleftrightarrow{AC}$ × the slope of $\overleftrightarrow{BD} = -1$, then $\overline{AC} \perp \overline{BD}$

* We can prove that the quadrialateral ABCD is a rhombus directly by using the distance between two points

we prove that :

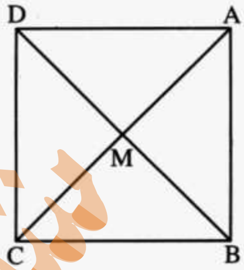
AB = BC = CD = DA



8 To prove that : the quadrilateral ABCD is a square

* First we prove that : the quadrilateral ABCD is a parallelogram , then

prove that :



• AB = BC (By using the distance between two points)

and the slope of $\overleftrightarrow{AB}$ × the slope of $\overleftrightarrow{BC} = -1$, then $\overline{AB} \perp \overline{BC}$

or • AC = BD (By using the distance between two points)

and the slope of $\overleftrightarrow{AC}$ × the slope of $\overleftrightarrow{BD} = -1$ then : $\overline{AC} \perp \overline{BD}$

* We can prove that the quadrilateral ABCD is a square by using the distance between two points

we prove that :

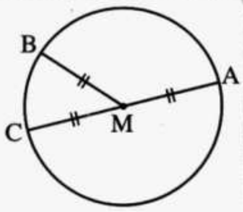
AB = BC = CD = DA , then the quadrilateral is a rhombus , then

prove that : AC = BD

9 To prove that : the points A , B , C lie on one circle of centre M

By using the distance between two points

we prove that : MA = MB = MC



Rules And laws

Area of rectangle

Area
Width | Length

Perimeter of rectangle

P
(L+W) | 2

Area of square

Area
L | L

Perimeter of square

P
L | 4

Circumference of circle

C
D | π

Circumference of circle

C
2 π | r

Volume of Cuboid

V
L | W | H

Volume of Cuboid

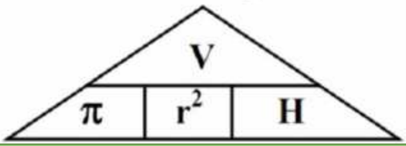
V
B.A | H

Area of triangle

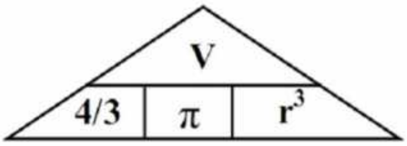
P
0.5 | B | H

Lateral area of Cylinder

Volume of Cylinder



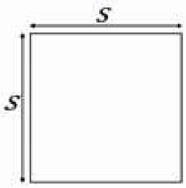
Volume of sphere



GEOMETRY SHAPES AND SOLIDS

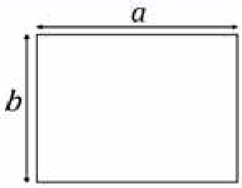
SQUARE

$P = 4s$
$A = s^2$



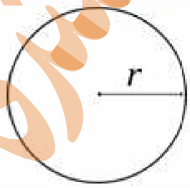
RECTANGLE

$P = 2a + 2b$
$A = ab$



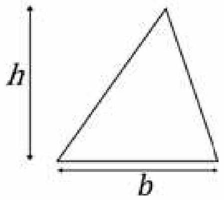
CIRCLE

$P = 2\pi r$
$A = \pi r^2$



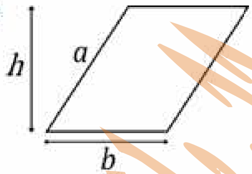
TRIANGLE

$P = a + b + c$
$A = \frac{1}{2}bh$



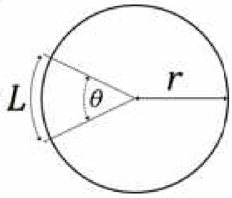
PARALLELOGRAM

$P = 2a + 2b$
$A = bh$



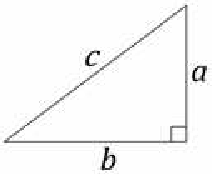
CIRCULAR SECTOR

$L = \pi r \dfrac{\theta}{180°}$
$A = \pi r^2 \dfrac{\theta}{360°}$



PYTHAGOREAN THEOREM

$a^2 + b^2 = c^2$
$c = \sqrt{a^2 + b^2}$

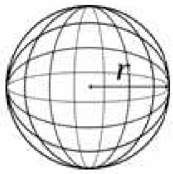


CIRCULAR RING

$A = \pi(R^2 - r^2)$

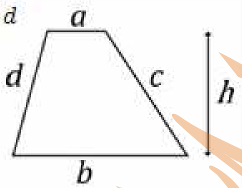
SPHERE

$S = 4\pi r^2$
$V = \dfrac{4\pi r^3}{3}$



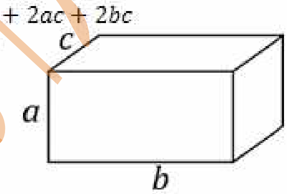
TRAPEZOID

$P = a + b + c + d$
$A = h\dfrac{a + b}{2}$



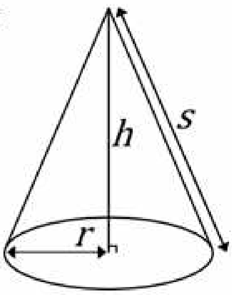
RECTANGULAR BOX

$A = 2ab + 2ac + 2bc$
$V = abc$



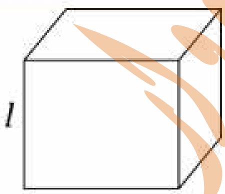
RIGHT CIRCULAR CONE

$A = \pi r^2 + \pi r s$
$s = \sqrt{r^2 + h^2}$
$V = \frac{1}{3}\pi r^2 h$



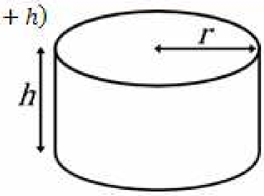
CUBE

$A = 6l^2$
$V = l^3$



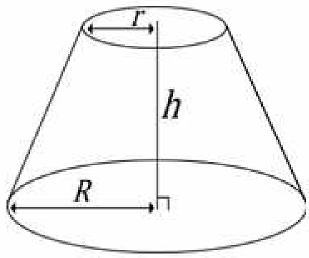
CYLINDER

$A = 2\pi r(r + h)$
$V = \pi r^2 h$



FRUSTUM OF A CONE

$V = \frac{1}{3}\pi h(r^2 + rR + R^2)$



[A] Choose the correct Answer :

1	$\tan 45° =$ …………… (a) $\sqrt{3}$ (b) 1 (c) $\frac{1}{\sqrt{3}}$ (d) $\frac{1}{2}$	
2	$\tan^2 45° =$ …………… (a) $\sqrt{3}$ (b) $\frac{1}{\sqrt{3}}$ (c) 1 (d) $\frac{1}{2}$	
3	$\sqrt{2} \sin 30° =$ …………… (a) $\sin 45°$ (b) $\sin 60°$ (c) $\cos 30°$ (d) $\cos 60°$	
4	$\tan 45° \sin 30° =$ …………… (a) $\frac{1}{2}$ (b) 1 (c) $\frac{2}{3}$ (d) $\frac{\sqrt{3}}{2}$	
5	$2 \sin 30° \cos 30° =$ …………… (a) $\sin 60°$ (b) $\cos 60°$ (c) $\tan 60°$ (d) $\tan 30°$	
6	$4 \cos 30° \tan 60° =$ …………… (a) 3 (b) $2\sqrt{3}$ (c) 6 (d) 12	
7	$\sin 30° + \cos 60° + \tan 45° =$ …………… (a) -2 (b) 1 (c) 1.5 (d) 2	
8	$2 \tan 45° - \frac{1}{\cos 60°} =$ …………… (a) zero (b) $\frac{1}{2}$ (c) $\frac{\sqrt{3}}{2}$ (d) 1	
9	If $\sin X = \frac{1}{2}$ where X is a measure of an acute angle , then $X =$ …………… ° (a) 90 (b) 60 (c) 45 (d) 30	
10	If $\sin X = \frac{1}{2}$, where X is an acute angle. $\therefore \sin 2X =$ …………… (a) 1 (b) 2 (c) $\frac{1}{2}$ (d) $\frac{\sqrt{3}}{2}$	
11	If $\cos X = \frac{1}{2}$ where X is an acute angle , then $X =$ …………… (a) 30° (b) 60° (c) 90° (d) 45°	

12	If $\sin X = 1$ where X is an angle , then $m(\angle X) =$ ....° (a) 30 (b) 60 (c) 45 (d) 90
13	If $\cos 2X = \frac{1}{2}$, X is the measure of an acute angle , then $m(\angle X) =$ .... ° (a) 15 (b) 30 (c) 45 (d) 60
14	If $\tan \frac{3X}{2} = 1$ where X is an acute angle , then $m(\angle X) =$ .... (a) 10° (b) 30° (c) 45° (d) 60°
15	If $\tan 3X = 1$, where X is an acute angle , then $3X =$ .... (a) 15° (b) 20° (c) 45° (d) 60°
16	If $\tan 3X = \sqrt{3}$ where $3X$ is an acute angle , then $m(\angle X) =$ ....° (a) 10 (b) 20 (c) 30 (d) 60
17	If $\tan (X + 15°) = \sqrt{3}$ where X is an acute angle , then $m(\angle X) =$ .... (a) 15° (b) 30° (c) 45° (d) 60°
18	If $\sin 30° = \cos \theta$ where θ is an acute angle , then $m(\angle \theta) =$ .... (a) 45° (b) 10° (c) 60° (d) 30°
19	If $\sin X = \cos 30°$ where X is an acute angle , then $m(\angle X) =$ ....° (a) 10 (b) 30 (c) 45 (d) 60
20	In ΔABC , if $m(\angle A) = 85°$, $\sin B = \cos B$, then $m(\angle C) =$ ....° (a) 30 (b) 45 (c) 50 (d) 60
21	In ΔABC , if $m(\angle B) = 90°$, then $\sin A + \cos C =$ .... (a) 2 sin A (b) 2 sin C (c) 2 sin B (d) 2 cos A
22	In ΔABC if $m(\angle B) = 90°$, $\sin A = \frac{4}{5}$, then $\sin C =$ .... (a) $\frac{4}{5}$ (b) $\frac{5}{4}$ (c) $\frac{3}{5}$ (d) $\frac{5}{3}$
23	If ABC is a right-angled triangle at B , then $\frac{BC}{AC} =$ .... (a) cos C (b) cos A (c) tan C (d) tan A

24	In Δ ABC , if m ($\angle$ B) = 90° , AB = 3 cm. , BC = 4 cm. , then sin A cos C = ... (a) 1 (b) $\frac{9}{25}$ (c) $\frac{12}{25}$ (d) $\frac{16}{25}$
25	The length of the line segment which is drawn between the two points (0 , 0) , (5 , 12) equals .... (a) 5 (b) 7 (c) 12 (d) 13
26	The distance between the two points (5 , 0) , (0 , 12) equals .... length unit. (a) 5 (b) 13 (c) 17 (d) 7
27	The distance between the two points (5 , 0) , (0 , – 12) equals .... length unit. (a) 12 (b) 13 (c) 17 (d) 5
28	The distance between the point A = (2 , – 5) and the point B = (5 , – 1) equals .... unit length. (a) 5 (b) 2 (c) – 5 (d) – 3
29	If A = (0 , 0) , B = (3 , 4) , then the length of $\overline{AB}$ = ... length unit. (a) 3 (b) 4 (c) 5 (d) 6
30	The distance between the point (4 , 3) and the origin point equals .... units. (a) 3 (b) 5 (c) 4 (d) 7
31	The distance between the point (– 3 , 4) and the point of origin equals .... (a) – 3 (b) 4 (c) 5 (d) – 5
32	The distance between the point (3 , – 4) and the origin point equals .... unit length. (a) 3 (b) 4 (c) 5 (d) 7
33	The distance between the point (3 , – 4) and X-axis = ... length unit. (a) 3 (b) 5 (c) 4 (d) – 4
34	The distance between the point (4 , – 3) and the X-axis equals .... length unit. (a) – 3 (b) 3 (c) 4 (d) 5

35	The distance between the point $(2 , -2)$ and the y-axis = ... length unit. (a) -2 (b) 2 (c) $2\sqrt{2}$ (d) 4
36	If the origin point is a centre of a circle of diameter length 6 length unit , then the point which belongs to the circle is .... (a) $(6 , 0)$ (b) $(0 , -6)$ (c) $(\sqrt{8} , 1)$ (d) $(1 , \sqrt{5})$
37	If the distance between the point $(a , 0)$ and the point $(0 , 1)$ equals one length unit , then a = ... (a) -1 (b) 0 (c) 1 (d) 2
38	The points $(-3 , 0)$, $(0 , 3)$, $(3 , 0)$ are the vertices of .... (a) a scalene triangle. (b) an equilateral triangle. (c) an obtuse-angled triangle. (d) a right-angled triangle and isosceles.
39	If A $(1 , 2)$ and B $(3 , 4)$, then the coordinates of the midpoint of $\overline{AB}$ is .... (a) $(1 , 3)$ (b) $(3 , 3)$ (c) $(2 , 3)$ (d) $(3 , 2)$
40	The coordinates of the midpoint of the line segment joining the two points $(3 , -8)$, $(-3 , 4)$ is .... (a) $(0 , -4)$ (b) $(0 , -2)$ (c) $(0 , 4)$ (d) $(0 , 2)$
41	If A = $(-1 , 2)$, B = $(5 , -2)$, then the midpoint of $\overline{AB}$ = ... (a) $(2 , 2)$ (b) $(2 , 0)$ (c) $(3 , 2)$ (d) $(4 , 0)$
42	) If $\overline{AB}$ is a diameter in a circle where A $(3 , -5)$ and B $(5 , 1)$, then the centre of the circle is .... (a) $(4 , -2)$ (b) $(4 , 2)$ (c) $(2 , 2)$ (d) $(8 , 2)$
43	) $\overline{AB}$ is a diameter in a circle where A $(3 , 6)$, B $(5 , -2)$, then the coordinates of the centre of the circle are .... (a) $(4 , 2)$ (b) $(4 , 6)$ (c) $(8 , 4)$ (d) $(2 , 8)$
44	) If the point $(0 , 4)$ is the midpoint of the two points $(-1 , -1)$, (x , y) , then the poin (x , y) is .... (a) $(1 , 9)$ (b) $(-1 , 9)$ (c) $\left(\frac{-1}{2} , \frac{3}{2}\right)$ (d) $(-1 , 3)$

45 If $(4 , -3)$ is the midpoint of $\overline{AB}$ where $A(3 , -4)$, then the coordinates of B is ....

(a) $(5 , -2)$ (b) $(2 , 5)$ (c) $(5 , 2)$ (d) $(3.5 , -3.5)$

46 The slope of the straight line which is parallel to the x-axis is ....

(a) -1 (b) zero. (c) 1 (d) undefined.

47 The slope of the straight line which is parallel to the y-axis is ....

(a) -1 (b) zero (c) 1 (d) undefined.

48 Slope of the line which makes with the positive direction of the x-axis angle of measure θ equals .... (where θ is the positive measure)

(a) $\sin\theta$ (b) $\sin^2\theta$ (c) $\tan\theta$ (d) $\cos\theta$

49 The product of the two slopes of two perpendicular lines equal to ....

(a) $\frac{-1}{2}$ (b) $\frac{1}{2}$ (c) 1 (d) -1

50 If $\overleftrightarrow{AB} // \overleftrightarrow{CD}$ and the slope of $\overleftrightarrow{CD}$ equals $\frac{1}{2}$, then the slope of $\overleftrightarrow{AB}$ equals ....

(a) -2 (b) $-\frac{1}{2}$ (c) $\frac{1}{2}$ (d) 2

51 If $\overleftrightarrow{AB} // \overleftrightarrow{CD}$ and the slope of $\overleftrightarrow{AB} = \frac{2}{3}$, then the slope of $\overleftrightarrow{CD}$ equals ....

(a) $\frac{-3}{2}$ (b) $\frac{-2}{3}$ (c) $\frac{2}{3}$ (d) $\frac{3}{2}$

52 If $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$ and the slope of $\overleftrightarrow{AB} = \frac{3}{5}$, then the slope $\overleftrightarrow{CD} =$ ....

(a) $-\frac{5}{3}$ (b) $\frac{5}{3}$ (c) $\frac{3}{5}$ (d) $\frac{9}{25}$

53 If $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$, and then slope of $\overleftrightarrow{AB} = \frac{1}{2}$, then the slope of $\overleftrightarrow{DC} =$ ....

(a) -2 (b) 2 (c) $\frac{1}{2}$ (d) $\frac{-1}{2}$

54 If $\overleftrightarrow{LM} \perp \overleftrightarrow{EO}$, $E(-1 , 2)$, $O(0 , 0)$, then the slope of $\overleftrightarrow{LM}$ equals ....

(a) -2 (b) $\frac{-1}{2}$ (c) $\frac{1}{2}$ (d) 2

55 If $\frac{-2}{3}$, $\frac{k}{2}$ are the slopes of two parallel straight lines , then $k =$ ....

(a) $\frac{-4}{3}$ (b) $\frac{-3}{4}$ (c) $\frac{1}{3}$ (d) 3

56 If $\frac{2}{3}$, $\frac{k}{3}$ are the slopes of two parallel straight lines , then k = ...

(a) $\frac{2}{9}$ (b) $\frac{9}{2}$ (c) 2 (d) -2

57 If the two straight lines L_1 , L_2 are parallel and the slope of $L_1 = \frac{3}{4}$

, then the slope of L_2 = ...

(a) $\frac{3}{4}$ (b) $\frac{-3}{4}$ (c) $\frac{4}{3}$ (d) $\frac{-4}{3}$

58 The slope of the straight line whose equation : $2x - 3y + 5 = 0$ equals ....

(a) $\frac{-3}{2}$ (b) $\frac{-2}{3}$ (c) $\frac{2}{3}$ (d) $\frac{3}{2}$

59 The slope of the straight line whose equation is : $3y = 5 - 2x$ equals ....

(a) $\frac{-3}{2}$ (b) $\frac{2}{3}$ (c) $\frac{-2}{3}$ (d) $\frac{3}{2}$

60 The straight line passing through two points $(-1, -1)$, $(4, 4)$ makes positive angle with the positive direction to the x-axis an angle measure = ...°

(a) 30 (b) 45 (c) 60 (d) 135

61 If the equation of the straight line is : $ax - by + c =$ zero , $b \neq 0$

, then its slope m = ...

(a) $\frac{b}{a}$ (b) $\frac{-a}{b}$ (c) $\frac{-b}{a}$ (d) $\frac{a}{b}$

62 The straight line whose equation is : $x - 3y - 6 = 0$ intercepts from the y-axis a part of length ....

(a) -6 (b) -2 (c) $\frac{1}{3}$ (d) 2

63 The straight line whose equation is : $2x - 3y + 6 = 0$ intercepts from the y-axis a part of length ....

(a) 6 (b) 4 (c) 2 (d) -6

64 The line whose equation : $3x + 4y - 5 = 0$ intersects a part of y-axis its length = ... units.

(a) 5 (b) -5 (c) $\frac{5}{4}$ (d) $\frac{-4}{3}$

65	The straight line whose equation is : $2y - 4x = 6$ intercepts from the y-axis a part of length = ... units. (a) 2 (b) 3 (c) 4 (d) 6
66	The straight line whose equation is : $3y = 2x + 6$ cuts a part from the y-axis with length equals .... unit of length. (a) 6 (b) 3 (c) 2 (d) $\frac{2}{3}$
67	The line : $2y = 3x + 12$ cuts from the y-axis part of length .... units. (a) 12 (b) 3 (c) 2 (d) 6
68	The equation of the straight line whose slope 1 and passing through the origin point is .... (a) $x = -1$ (b) $y = -1$ (c) $y = -x$ (d) $y = x$
69	The equation of the straight line whose its slope = 2 and passes through the origin point is .... (a) $x = 2$ (b) $y = 2$ (c) $y = 2x$ (d) $y = -2x$
70	The equation of the straight line which passes through the origin point and its slope = 3 is .... (a) $y = 3x$ (b) $x = 3$ (c) $y = 3$ (d) $y = \frac{1}{3}$
71	The equation of the straight line which passes through the point $(2, -3)$, parallel to x-axis is .... (a) $x = -2$ (b) $y = -3$ (c) $x = 2$ (d) $y = 3$
72	If the two straight lines : $3x - 4y - 3 = 0$, $ky + 3x - 8 = 0$ are parallel, then k = ... (a) -4 (b) -3 (c) 3 (d) 4
73	The two straight lines : $x + y = 5$, $kx + 2y = 0$ are parallel when k = ... (a) 2 (b) -1 (c) 1 (d) -2

74 If the two straight lines : $x + y = 5$ and $k\,x + 2\,y = 0$ are perpendicular , then k = ……………

(a) 2 (b) 1 (c) – 1 (d) – 2

75 If the straight line whose equation : $x + 3\,y - 6 = 0$ is perpendicular to the straight line whose equation : $a\,x - 3\,y + 7 = 0$, then a = ……………

(a) 2 (b) 9 (c) 4 (d) 1

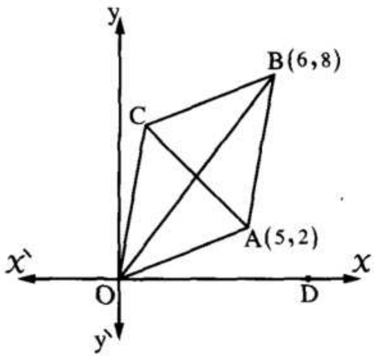
76 If the two straight lines : $3\,x - 4\,y - 5 = 0$ and $k\,x - 3\,y + 8 = 0$ are perpendicular , then k = ……………

(a) – 4 (b) – 3 (c) 3 (d) 4

77 The area of the triangle in square units which is bounded by the straight lines $3\,x - 4\,y = 12$, $x = 0$, $y = 0$ equals ……………

(a) 6 (b) – 6 (c) 12 (d) – 12

78 OABC is a parallelogram where A (5 , 2) B (6 , 8) , O is the origin point.



(1) The coordinates of the point C = ……………

(a) (2 , 5) (b) (1 , 5)

(c) (1 , 6) (d) (2 , 6)

(2) OB = …………… length unit.

(a) 5 (b) 6 (c) 8 (d) 10

(3) tan m (∠ AOD) = ……………

(a) 0.3 (b) 0.4 (c) 0.6 (d) 0.8

(4) The equation of $\overleftrightarrow{OC}$ is ……………

(a) $y = 6\,x$ (b) $y = -6\,x$ (c) $y = x$ (d) $y = -x$

(5) The equation of the straight line passing through the origin point and perpendicular to $\overleftrightarrow{OB}$ ……………

(a) $y = \frac{4}{3}\,x$ (b) $y = \frac{3}{4}\,x$ (c) $y = -\frac{4}{3}\,x$ (d) $y = -\frac{3}{4}\,x$

(6) cos m (∠ BOD) = ……………

(a) 0.8 (b) 0.7 (c) 0.6 (d) 0.4

Choose the correct Answers

<table>
<tr><th>Sn.</th><th>Answer</th><th>Sn.</th><th>Answer</th><th>Sn.</th><th>Answer</th><th>Sn.</th><th>Answer</th></tr>
<tr><td>1</td><td>B</td><td>21</td><td>A</td><td>41</td><td>B</td><td>61</td><td>D</td></tr>
<tr><td>2</td><td>C</td><td>22</td><td>C</td><td>42</td><td>A</td><td>62</td><td>D</td></tr>
<tr><td>3</td><td>A</td><td>23</td><td>A</td><td>43</td><td>A</td><td>63</td><td>C</td></tr>
<tr><td>4</td><td>A</td><td>24</td><td>D</td><td>44</td><td>A</td><td>64</td><td>C</td></tr>
<tr><td>5</td><td>A</td><td>25</td><td>D</td><td>45</td><td>A</td><td>65</td><td>B</td></tr>
<tr><td>6</td><td>C</td><td>26</td><td>B</td><td>46</td><td>B</td><td>66</td><td>C</td></tr>
<tr><td>7</td><td>D</td><td>27</td><td>B</td><td>47</td><td>D</td><td>67</td><td>D</td></tr>
<tr><td>8</td><td>A</td><td>28</td><td>A</td><td>48</td><td>C</td><td>68</td><td>D</td></tr>
<tr><td>9</td><td>D</td><td>29</td><td>C</td><td>49</td><td>D</td><td>69</td><td>C</td></tr>
<tr><td>10</td><td>D</td><td>30</td><td>B</td><td>50</td><td>C</td><td>70</td><td>A</td></tr>
<tr><td>11</td><td>B</td><td>31</td><td>C</td><td>51</td><td>C</td><td>71</td><td>B</td></tr>
<tr><td>12</td><td>D</td><td>32</td><td>C</td><td>52</td><td>A</td><td>72</td><td>A</td></tr>
<tr><td>13</td><td>B</td><td>33</td><td>C</td><td>53</td><td>A</td><td>73</td><td>A</td></tr>
<tr><td>14</td><td>B</td><td>34</td><td>B</td><td>54</td><td>C</td><td>74</td><td>D</td></tr>
<tr><td>15</td><td>C</td><td>35</td><td>B</td><td>55</td><td>A</td><td>75</td><td>B</td></tr>
<tr><td>16</td><td>B</td><td>36</td><td>C</td><td>56</td><td>C</td><td>76</td><td>A</td></tr>
<tr><td>17</td><td>C</td><td>37</td><td>B</td><td>57</td><td>A</td><td>77</td><td>A</td></tr>
<tr><td>18</td><td>C</td><td>38</td><td>D</td><td>58</td><td>C</td><td rowspan="3">78</td><td rowspan="3">1)C – 2) D
3)B – 4)A
5)D – 6)C</td></tr>
<tr><td>19</td><td>D</td><td>39</td><td>C</td><td>59</td><td>C</td></tr>
<tr><td>20</td><td>C</td><td>40</td><td>B</td><td>60</td><td>B</td></tr>
</table>

[B] Essay Problems : -

1	ABC is a right-angled triangle at B where : AB = 3 cm. , AC = 5 cm. **Find the value of each of the following :** (1) $\tan A \times \tan C$ (2) $\sin^2 A + \sin^2 C$ **2016 Exam (10) Question (3) (a)**
2	**Without using calculator , find the numerical value of the expression :** $\cos 60° \sin 30° - \sin 60° \cos 30°$ **2016 Exam (11) Question (2) (a)**
3	Without using the calculator , find the numerical value of the following expression : $2 \sin 45° \cos 45° + 4 \sin 30° \cos 60°$ **2016 Exam (1) Question (2) (a)**
4	Find the value of : $\sin 45° \cos 45° + \sin 30° \cos 60° - \cos^2 30°$ **2016 Exam (13) Question (3) (a)**
5	**Without using calculator find the value of :** $\tan^2 45° - 4 \cos^2 60°$ **2016 Exam (12) Question (2) (a)**
6	**Without using calculator , find the value of :** $\frac{\cos^2 60° + \cos^2 30° + \tan^2 45°}{\sin 60° \tan 60° - \sin 30°}$ **2016 Exam (7) Question (2) (a)**
7	**Without using calculator , prove that :** $\cos 60° = \cos^2 30° - \sin^2 30°$ **2016 Exam (2) Question (2) (a)**
8	**Prove that :** $\tan^2 60° - \tan^2 45° = 4 \sin 30°$ (without using a calculator) **2016 Exam (4) Question (3) (a)**
9	**Find the value of X (where X is a measure of acute angle) if :** $2 \sin X = \tan^2 60° - 2 \tan 45°$ **2016 Exam (12) Question (4) (a)**
10	**Prove that :** $\sin^3 30° = 9 \cos^3 60° - \tan^2 45°$ **2016 Exam (15) Question (2) (a)**
11	**Without using calculator prove that :** $\tan 60° = 2 \tan 30° \div (1 - \tan^2 30°)$ **2016 Exam (10) Question (2) (a)**

12	**Prove that :** $\sin 45° \cos 45° + \sin 30° \cos 60° = \cos^2 30°$ 2016 Exam (12) Question (3) (a)
13	**Prove that without calculator :** $\tan 60° = \dfrac{2 \tan 30°}{1 - \tan^2 30°}$ 2016 Exam (15) Question (4) (a)
14	**Without using the calculator prove that :** $2 \cos^2 30° - 1 = 1 - 2 \sin^2 30°$ 2016 Exam (5) Question (2) (a)
15	ABC is a triangle in which , AB = AC = 10 cm. , BC = 12 cm. , $\overline{AD} \perp \overline{CB}$ to cut it at D **Prove that :** (1) $\sin B + \cos C = 1.4$ (2) $\sin^2 C + \cos^2 C = 1$ 2016 Exam (4) Question (2) (b)
16	**Without using calculator prove that :** $2 \sin 30° \cos 30° = \sin 60°$ 2016 Exam (14) Question (2) (b)
17	If $\sin \theta = \sin 45° \cos 30° + \cos 45° \sin 30°$ find m ($\angle$ θ) where θ is an acute angle. 2016 Exam (10) Question (4) (a)
18	If $\sin X = \tan 30° \sin 60°$ where X is an acute angle find X in degrees. **, then find the value of :** $4 \cos X \tan 2X$ without using the calculator. 2016 Exam (6) Question (4) (a)
19	**Find m ($\angle$ θ) where θ is an acute angle :** $2 \sin \theta = \tan^2 60° - 2 \tan 45°$ 2016 Exam (15) Question (3) (a)
20	If $\sin X = 2 \sin 60° \cos 30° - \tan 45°$ Find the value of X in degrees **such that :** $X \in [0° , 90°]$ 2016 Exam (9) Question (4) (b)
21	**Find the value of X where :** $X \sin 30° \cos^2 45° = \sin^2 60°$ 2016 Exam (3) Question (2) (a)
22	If $\sin^2 45° = \cos E \tan 30°$ find m ($\angle$ E) where E is an acute angle. 2016 Exam (11) Question (3) (a)

23 If $2\cos(X + 15°) = \sqrt{2}$ where X is measure an acute angle , find $(\tan 2X - \sin 2X)$

2016 Exam (5) Question (3) (b)

24 Find θ where $0° < \theta < 90°$, if $\sin\theta \sin 45° \cos 45° \tan 60° = \tan^2 45° - \cos^2 60°$

2016 Exam (4) Question (5) (b)

25 ABC is a right-angled triangle at B , if $2\,AB = \sqrt{3}\,AC$

Find the main trigonometrical of the angle C

2016 Exam (3) Question (3) (a)

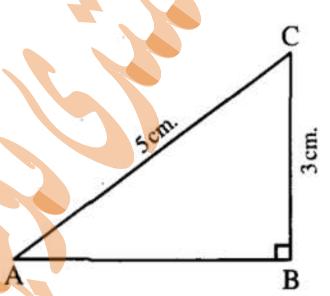
26 **In the opposite figure :**

ABC is a right-angled triangle at B

, AC = 5 cm. , BC = 3 cm.

(1) Find the length of $\overline{AB}$

(2) Find the value : cos A sin C – sin A cos C



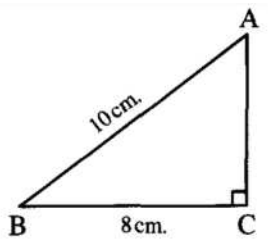
2016 Exam (13) Question (2) (a)

27 **In the opposite figure :**

ABC is a right-angled triangle at C , in which :

AB = 10 cm. and BC = 8 cm. **Find the value of :**

(1) tan B × tan A (2) m (∠ B)



2016 Exam (1) Question (4) (a)

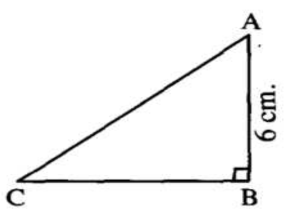
28 **In the opposite figure :**

ABC is a right-angled triangle at B

where AB = 6 cm. , $\tan C = \frac{3}{4}$

Find : (1) The length of each of $\overline{BC}$, $\overline{AC}$

(2) sin A + cos A



2016 Exam (6) Question (3) (b)

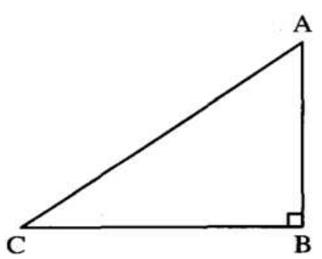
29 **In the opposite figure :**

ABC is a right-angled triangle at B

and m (∠ C) = 2 m (∠ A) , **find :**

(1) The measure of each ∠ A and ∠ C

(2) The value of sin A + cos C



2016 Exam (9) Question (3) (b)

30

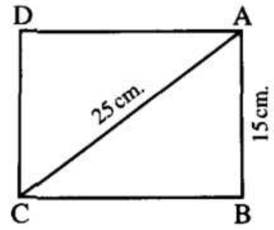
In the opposite figure :

ABCD is a rectangle where : AB = 15 cm.

, AC = 25 cm.

Find : (1) m (∠ ACB)

(2) The surface area of the rectangle ABCD



2016 Exam (4) Question (5) (a)

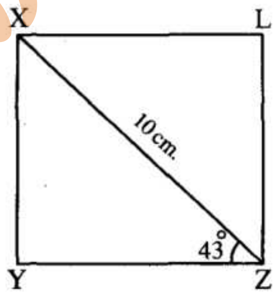
31

In the opposite figure :

XYZL is a rectangle , XZ = 10 cm.

, m (∠ XZY) = 43°

Calculate the perimeter of triangle XYZ



2016 Exam (8) Question (2) (b)

32

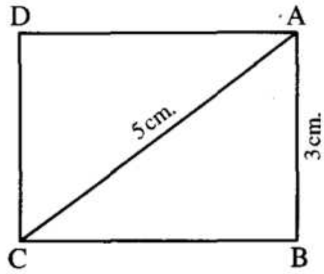
In the opposite figure :

ABCD is a rectangle in which :

AB = 3 cm. , AC = 5 cm.

(1) Find area of the rectangle ABCD

(2) m (∠ ACB)



2016 Exam (9) Question (2) (b)

33

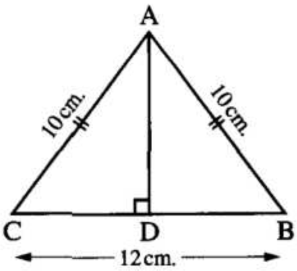
In the opposite figure :

ABC is a triangle in which : AB = AC = 10 cm.

, BC = 12 cm. , $\overline{AD} \perp \overline{CB}$

Prove that : (1) $\sin^2 C + \cos^2 C = 1$

(2) $\sin B + \cos C > 1$



2016 Exam (7) Question (3) (a)

34

Find the length of $\overline{MN}$ when M (7 , – 3) , N (0 , 4)

2016 Exam (13) Question (4) (a)

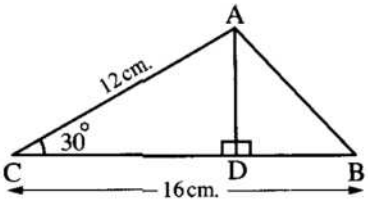
35

Prove that : the triangle whose vertices A (3 , 2) , B (– 4 , 1) , C (2 , – 1) is a right-angled triangle at C , then find its surface area.

2016 Exam (2) Question (2) (b)

36

In the opposite figure :



ABC is a triangle , $\overline{AD} \perp \overline{BC}$, AC = 12 cm.

, BC = 16 cm. and m (∠ C) = 30°

Complete the following :

* sin 30° = $\frac{AD}{\cdots\cdots}$

* AD = ·············· × sin 30° = ·············· cm.

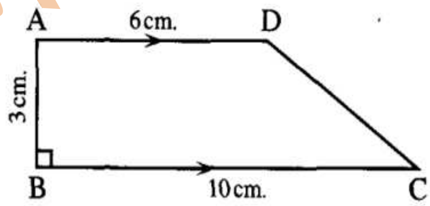
* The area of Δ ABC = ·············· × AD × BC

* The area of Δ ABC = ·············· × ·············· × ·············· = ·············· cm^2.

2016 Exam (13) Question (5) (b)

37

In the opposite figure :



ABCD is a trapezium in which : $\overline{AD}$ // $\overline{BC}$

, m (∠ B) = 90° , if AB = 3 cm. , AD = 6 cm.

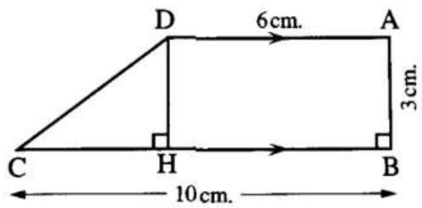
, BC = 10 cm.

Prove that : cos (∠ DCB) – tan (∠ ACB) = $\frac{1}{2}$

2016 Exam (3) Question (4) (a)

38

In the opposite figure :



ABCD is a trapezium in which :

$\overline{AD}$ // $\overline{BC}$, $\overline{DH} \perp \overline{BC}$, m (∠ B) = 90°

, AD = 6 cm. , AB = 3 cm. , BC = 10 cm.

Prove that : cos (∠ DCB) – tan (∠ ACB) = $\frac{1}{2}$

2016 Exam (7) Question (4) (a)

39

Prove that : the triangle ABC whose vertices A (1 , 4) , B (– 1 , – 2) , C (2 , – 3) is a right-angled triangle at B , then find its area.

2016 Exam (10) Question (3) (b)

40

Prove that : the triangle whose vertices A (1 , – 2) , B (– 4 , 2) , C (1 , 6) is an isosceles triangle.

2016 Exam (15) Question (3) (b)

41 Determine the type of the triangle whose vertices are A (– 2 , 3) , B (1 , – 1) and C (1 , 7) with respect to the lengths of its sides , then find its perimeter.

2016 Exam (1) Question (3) (b)

42 Identify the type of the triangle whose vertices are A (– 2 , 4) , B (3 , – 1) , C (4 , 5) due to its sides lengths.

2016 Exam (11) Question (2) (b)

43 **Prove that the points :** A (3 , – 1) , B (– 4 , 6) and C (2 , – 2) lie on a circle whose centre is M (– 1 , 2) , then find the circumference of the circle. ($\pi \simeq 3.14$)

2016 Exam (1) Question (5) (b)

44 **Find the value of :** a if the distance between the points (a , 7) , (2 a , – 5) equals 13

2016 Exam (7) Question (3) (b)

45 If the distance of the point (x , 5) from the point (6 , 1) equals $2\sqrt{5}$

, then find the value of x

2016 Exam (10) Question (5) (a)

46 If the distance between the point (x , 7) and the point (– 2 , 3) equal 5 unit length

Find the value of x

2016 Exam (14) Question (3) (a)

47 If A (x , 3) , B (3 , 2) and C (5 , 1)

Given that : AB = BC **Find the values of** x

2016 Exam (8) Question (5) (b)

48 Calculate the coordinates of the point C which is the midpoint of $\overline{AB}$ where : A (3 , – 7) and B (– 5 , – 3)

2016 Exam (13) Question (2) (b)

49 If the two points A = (2 , – 1) , B = (5 , 3) **Find :**

(1) The length of $\overline{AB}$

(2) The coordinates of the point C which is the midpoint of $\overline{AB}$

2016 Exam (9) Question (5) (a)

50	If C is the midpoint of $\overline{AB}$ where C (– 3 , k) , A (h , – 6) , B (9 , – 11) **Find :** k and h 2016 Exam (3) Question (4) (b)
51	If C is the midpoint of $\overline{AB}$, then find the values of each of x , y If A (x , 3) , B (6 , y) and C (4 , 6) 2016 Exam (12) Question (3) (b)
52	$\overline{AB}$ is a diameter of circle M if B (8 , 11) , M (5 , 7) , then find the coordinates of A 2016 Exam (11) Question (3) (b)
53	In Δ ABC , A (0 , 8) , B (3 , 2) , C (– 3 , 6) , $\overline{AD}$ is a median , M is a midpoint of $\overline{AD}$ Find the coordinates of the two points D , M 2016 Exam (14) Question (4) (a)
54	**Prove that :** the point A (– 3 , 0) , B (3 , 4) and C (1 , – 6) are the vertices of an isosceles triangle its vertex A , then find the length of the line segment which is drawn from A and perpendicular to $\overline{BC}$ 2016 Exam (12) Question (4) (b)
55	ABCD is a parallelogram where A (3 , 2) , B (4 , – 5) , C (0 , – 3) find the coordinates of the point of intersection of its diagonals , then find the coordinates of D 2016 Exam (2) Question (5) (b)
56	If the points A (3 , 2) , B (4 , – 3) , C (– 1 , – 2) , D (– 2 , 3) are vertices of a rhombus **Find :** (1) The coordinates of the point of intersection of the two diagonals. (2) The area of the rhombus ABCD (3) m (∠ ABC) 2016 Exam (5) Question (4) (a)
57	**Prove that :** the straight line which passes through the two points $\left(4 , 2\sqrt{3}\right)$, $\left(5 , 3\sqrt{3}\right)$ is parallel to the straight line which makes with positive direction of x-axis an angle of measure 60° 2016 Exam (2) Question (4) (b)
58	**Prove that :** the straight line which passes through the two points (3 , 5) and (2 , 6) is perpendicular to the straight line which makes with the positive direction of the x-axis an angle of measure 45° 2016 Exam (1) Question (4) (b)

59	**Prove that :** the straight line which passes through the two points $(-3, 2)$, $(4, -5)$ is perpendicular to the straight line which make an angle of measure $45°$ with the positive direction of x-axis. **2016 Exam (14) Question (2) (a)**
60	**Prove that :** the points A $(5, 1)$, B $(1, -3)$, C $(-5, 3)$, D $(-1, 7)$ are the vertices of the rectangle. **2016 Exam (6) Question (2) (b)**
61	If $\overleftrightarrow{AB}$ // the x-axes where A $(5, -4)$, B $(-2, y)$ Find the value of y **2016 Exam (6) Question (5) (a)**
62	If the point A $(0, k)$, B $(1, 3)$, C $(2, 5)$ are collinear, find the value of : k **2016 Exam (14) Question (4) (b)**
63	If the straight line whose equation : $a x - 2y + 5 = 0$ is parallel to the straight line which makes angle of measure $45°$ with the positive direction of the x-axis, find the value of a **2016 Exam (9) Question (3) (a)**
64	If the straight line L_1 passing through the two points $(-3, 1)$, $(2, k)$ and the straight line L_2 makes with the positive direction to the x-axis an angle its measure is $45°$, then find the value of k if $L_1 \perp L_2$ **2016 Exam (7) Question (4) (b)**
65	Find the equation of the straight line which its slope is $\frac{1}{2}$ and intercepts from the positive part of y-axis 2 units. **2016 Exam (2) Question (5) (a)**
66	Find the equation of the straight line whose slope equals $\frac{1}{2}$ and passes through the point $(4, 7)$ **2016 Exam (1) Question (2) (b)**
67	Find the equation of the straight line which passes through the point $(3, -5)$ and whose slope $\frac{3}{4}$ **2016 Exam (9) Question (4) (a)**
68	Find the equation of the straight line passing through the two points $(2, -3)$ and $(5, -1)$ **2016 Exam (4) Question (4) (a)**

69	Find the equation of the axis of symmetry of $\overline{AB}$ where A (1 , 3) and B (3 , 5) **2016 Exam (5) Question (2) (b)**
70	Find the equation of the straight line passing through the two points A (1 , 2) , B (– 1 , 6) **2016 Exam (5) Question (3) (a)**
71	Write the equation of the straight line that passes through the two points (2 , 3) and (– 3 , 2) **2016 Exam (12) Question (2) (b)**
72	ABC is a right-angled triangle at B such that A (1 , 4) , B (– 1 , – 2) find the equation of $\overleftrightarrow{BC}$ **2016 Exam (9) Question (5) (b)**
73	Find the equation of the straight line passing through the point (3 , – 5) and parallel to the straight line : $x + 2y - 7 = 0$ **2016 Exam (3) Question (2) (b)**
74	Find the equation of the straight line passing through the point (2 , 3) and parallel to the straight line : $2x - y + 5 = 0$ **2016 Exam (10) Question (4) (b)**
75	Find the equation of the straight line which passes through the point (3 , – 5) and perpendicular to the straight line : $x + 2y - 7 = 0$ **2016 Exam (2) Question (3) (b)**
76	Find the equation of the straight line which passes through the point (3 , 4) and perpendicular to the straight line : $5x - 2y + 7 = 0$ **2016 Exam (7) Question (2) (b)**
77	Find the equation of the straight line passing through the point (1 , 5) and perpendicular on the straight line passing through the two points A (3 , – 1) , B (– 7 , 4) **2016 Exam (13) Question (3) (b)**
78	Find the equation of the straight line passing through the point (1 , 2) and perpendicular on the straight line passing through the two points A (2 , – 3) , B (5 , – 4) **2016 Exam (15) Question (2) (b)**

79	Find the equation of the straight line which passes through the point (1 , 6) and the midpoint of $\overline{AB}$, where A (1 , – 2) , B (3 , – 4) 2016 Exam (4) Question (2) (a)
80	A straight line , its slope is $\frac{1}{2}$ and intercepts from the positive part of y-axis two units. **Find :** (1) The equation of this straight line. (2) Its intersection point with the X-axis. 2016 Exam (10) Question (5) (b)
81	ABCD is a square where A (5 , 4) , C (– 1 , 6) Find the equation $\overleftrightarrow{BD}$ 2016 Exam (6) Question (3) (a)
82	$\overline{AB}$ is a diameter of the circle M if B (8 , 11) , M (5 , 7) , **then find :** (1) The coordinates of A (2) The equation of the perpendicular straight line to $\overline{AB}$ from the point B 2016 Exam (7) Question (5) (b)
83	Find the equation of the straight line which intercepts from the coordinate axes (X-axis , y-axis) two positive parts of lengths 3 and 6 respectively. Then find the area of the bounded triangle by the straight line and the X-axis and y-axis. 2016 Exam (6) Question (5) (b)
84	ABC is a triangle where A (1 , 2) , B (5 , – 2) , C (3 , 4) , D is the midpont of $\overline{AB}$ drawn $\overrightarrow{DE}$ // $\overleftrightarrow{BC}$ and intersects $\overline{AC}$ in E , find the equation of the straight line $\overleftrightarrow{DE}$ 2016 Exam (3) Question (5) (a)
85	If the two straight lines : $X + y = 2$ and $3y + kX = 0$ are parallel, find the value of k 2016 Exam (12) Question (5) (a)
86	Find the slope of the straight line $3X + 4y - 5 = 0$ and then find the length of the intercepted part from y-axis. 2016 Exam (13) Question (5) (a)
87	If the ratio between the measures of two supplementary angles is 3 : 5 Find the measure of each angle by the degree measure. 2016 Exam (14) Question (3) (b)

88

Calculate the slope and the intercepted part of y-axis by the straight line whose equation :

$\frac{x}{2} + 3y = 6$

2016 Exam (8) Question (2) (a)

89

Find the slope and the intercepted part of the y-axis of the straight line :

$\frac{x}{3} + \frac{y}{2} = 1$

2016 Exam (12) Question (5) (b)

90

The opposite table represents linear relation :

(1) Find the equation of the straight line.

(2) Find the length of the intersected part from the y-axis.

(3) Find the value of a

x	1	2	3
$y = f(x)$	1	3	a

2016 Exam (3) Question (5) (b)

91

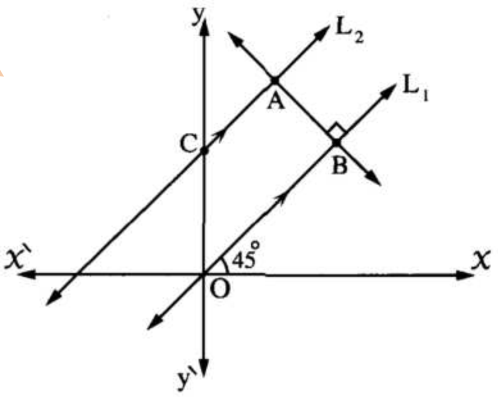
In the opposite figure :

L_1 and L_2 are two parallel straight lines, L_1 make with the positive direction of the x-axis angle of measure 45° and passes of origin point O , $A \in L_2$ where A (1 , 5) , $\overleftrightarrow{AB} \perp L_1$, L_2 cuts y-axis at the point C

Find : (1) The equation of L_1

(2) The equation of L_2

(3) The length of $\overline{AB}$



2016 Exam (5) Question (5) (a)

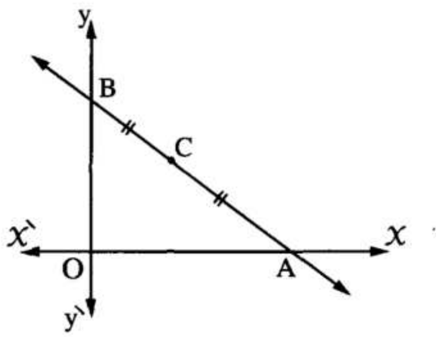
92

In the opposite figure :

C is the midpoint of $\overline{AB}$, where C (4 , 3)

(1) Find coordinates of each of the two points A , B

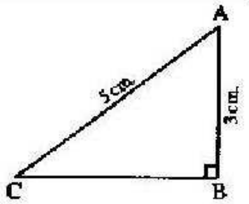
(2) The equation of the straight line $\overleftrightarrow{AB}$



2016 Exam (8) Question (4) (a)

Essay Problems Answers

Problem number [1]



$\because m(\angle B) = 90°$

$\therefore (BC)^2 = (5)^2 - (3)^2 = 16$

$\therefore BC = 4$ cm.

(1) $\tan A \times \tan C = \frac{4}{3} \times \frac{3}{4} = 1$

(2) $\sin^2 A + \sin^2 C = \left(\frac{4}{5}\right)^2 + \left(\frac{3}{5}\right)^2 = \frac{16}{25} + \frac{9}{25} = 1$

Problem number [2]

$\cos 60° \sin 30° - \sin 60° \cos 30°$

$= \frac{1}{2} \times \frac{1}{2} - \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} = \frac{1}{4} - \frac{3}{4} = -\frac{1}{2}$

Problem number [3]

$2 \sin 45° \cos 45° + 4 \sin 30° \cos 60°$

$= 2 \times \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}} + 4 \times \frac{1}{2} \times \frac{1}{2} = 2$

Problem number [4]

$\sin 45° \cos 45° + \sin 30° \cos 60° - \cos^2 30°$

$= \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}} + \frac{1}{2} \times \frac{1}{2} - \left(\frac{\sqrt{3}}{2}\right)^2 = \frac{1}{2} + \frac{1}{4} - \frac{3}{4} = 0$

Problem number [5]

$\tan^2 45° - 4\cos^2 60° = (1)^2 - 4 \times \left(\frac{1}{2}\right)^2$

$= 1 - 4 \times \frac{1}{4} = 0$

Problem number [6]

$$\frac{\cos^2 60° + \cos^2 30° + \tan^2 45°}{\sin 60° \tan 60° - \sin 30°}$$

$$= \frac{\left(\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2 + (1)^2}{\frac{\sqrt{3}}{2} \times \sqrt{3} - \frac{1}{2}} = \frac{\frac{1}{4} + \frac{3}{4} + 1}{\frac{3}{2} - \frac{1}{2}} = 2$$

Problem number [7]

$\because \cos 60° = \frac{1}{2}$ (1)

, $\cos^2 30° - \sin^2 30° = \left(\frac{\sqrt{3}}{2}\right)^2 - \left(\frac{1}{2}\right)^2 = \frac{3}{4} - \frac{1}{4}$

$= \frac{1}{2}$ (2)

From (1) and (2) : $\therefore \cos 60° = \cos^2 30° - \sin^2 30°$

Problem number [8]

$\because \tan^2 60° - \tan^2 45° = \left(\sqrt{3}\right)^2 - (1)^2$

$= 3 - 1 = 2$ (1)

, $4 \sin 30° = 4 \times \frac{1}{2} = 2$ (2)

From (1) and (2) : $\therefore \tan^2 60° - \tan^2 45° = 4 \sin 30°$

Problem number [9]

$\because 2 \sin x = \tan^2 60° - 2 \tan 45°$

$\therefore 2 \sin x = \left(\sqrt{3}\right)^2 - 2 \times 1$

$\therefore \sin x = \frac{3-2}{2} = \frac{1}{2}$ $\therefore x = 30°$

Problem number [10]

$\because \sin^3 30° = \left(\frac{1}{2}\right)^3 = \frac{1}{8}$ (1)

, $9 \cos^3 60° - \tan^2 45° = 9 \times \left(\frac{1}{2}\right)^3 - (1)^2$

$= \frac{9}{8} - 1 = \frac{1}{8}$ (2)

From (1) and (2) :

$\therefore \sin^3 30° = 9 \cos^3 60° - \tan^2 45°$

Problem number [11]

$\because \tan 60° = \sqrt{3}$ (1)

, $2 \tan 30° \div (1 - \tan^2 30°)$

$$= \frac{2 \times \frac{1}{\sqrt{3}}}{1 - \left(\frac{1}{\sqrt{3}}\right)^2} = \frac{\frac{2}{\sqrt{3}}}{1 - \frac{1}{3}} = \frac{\frac{2}{\sqrt{3}}}{\frac{2}{3}} = \sqrt{3} \quad (2)$$

Problem number [12]

$\because \sin 45° \cos 45° + \sin 30° \cos 60°$

$= \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}} + \frac{1}{2} \times \frac{1}{2} = \frac{1}{2} + \frac{1}{4} = \frac{3}{4}$ (1)

, $\cos^2 30° = \left(\frac{\sqrt{3}}{2}\right)^2 = \frac{3}{4}$ (2)

From (1) and (2) :

$\therefore \sin 45° \cos 45° + \sin 30° \cos 60° = \cos^2 30°$

Problem number [13]

$\because \tan 60^\circ = \sqrt{3}$ (1)

$, \frac{2\tan 30^\circ}{1-\tan^2 30^\circ} = \frac{2\times\frac{1}{\sqrt3}}{1-\left(\frac{1}{\sqrt3}\right)^2} = \frac{\frac{2}{\sqrt3}}{1-\frac{1}{3}} = \frac{\frac{2}{\sqrt3}}{\frac{2}{3}} = \sqrt3$ (2)

From (1) and (2) : $\therefore \tan 60^\circ = \frac{2\tan 30^\circ}{1-\tan^2 30^\circ}$

Problem number [14]

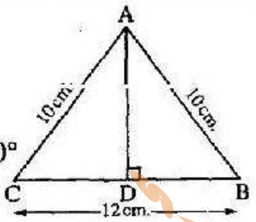
$\because 2\cos^2 30^\circ - 1 = 2\times\left(\frac{\sqrt3}{2}\right)^2 - 1$

$= \frac{3}{2} - 1 = \frac{1}{2}$ (1)

$, 1 - 2\sin^2 30^\circ = 1 - 2\times\left(\frac{1}{2}\right)^2 = 1 - \frac{1}{2} = \frac{1}{2}$ (2)

From (1) and (2) : $\therefore 2\cos^2 30^\circ - 1 = 1 - 2\sin^2 30^\circ$

Problem number [15]



$\because \overline{AD} \perp \overline{BC}$, $AB = AC$

$\therefore BD = CD = 6$ cm.

In ΔABD : $\because m(\angle ADB) = 90^\circ$

$\therefore (AD)^2 = (10)^2 - (6)^2 = 64$

$\therefore AD = 8$ cm.

(1) L.H.S $= \sin B + \cos C = \frac{8}{10} + \frac{6}{10} = 1.4 =$ R.H.S

(2) L.H.S $= \sin^2 C + \cos^2 C$

$= \left(\frac{8}{10}\right)^2 + \left(\frac{6}{10}\right)^2 = \frac{64}{100} + \frac{36}{100} = 1 =$ R.H.S

Problem number [16]

$\because 2\sin 30^\circ \cos 30^\circ = 2\times\frac{1}{2}\times\frac{\sqrt3}{2} = \frac{\sqrt3}{2}$ (1)

$, \sin 60^\circ = \frac{\sqrt3}{2}$ (2)

From (1) and (2) : $\therefore 2\sin 30^\circ \cos 30^\circ = \sin 60^\circ$

Problem number [17]

$\because \sin\theta = \sin 45^\circ \cos 30^\circ + \cos 45^\circ \sin 30^\circ$

$\therefore \sin\theta \frac{1}{\sqrt2}\times\frac{\sqrt3}{2} + \frac{1}{\sqrt2}\times\frac{1}{2} = \frac{\sqrt3+1}{2\sqrt2}$

$\therefore \theta = 75^\circ$

Problem number [18]

$\because \sin X = \tan 30^\circ \sin 60^\circ$

$\therefore \sin X = \frac{1}{\sqrt3}\times\frac{\sqrt3}{2} = \frac{1}{2}$ $\therefore X = 30^\circ$

$\therefore 4\cos X \tan 2X = 4\cos 30^\circ \tan 60^\circ$

$= 4\times\frac{\sqrt3}{2}\times\sqrt3 = 6$

Problem number [19]

$\because 2\sin\theta = \tan^2 60^\circ - 2\tan 45^\circ$

$\therefore 2\sin\theta = \left(\sqrt3\right)^2 - 2\times 1 = 1$

$\therefore \sin\theta = \frac{1}{2}$ $\therefore \theta = 30^\circ$

Problem number [20]

$\because \sin X = 2\sin 60^\circ \cos 30^\circ - \tan 45^\circ$

$\therefore \sin X = 2\times\frac{\sqrt3}{2}\times\frac{\sqrt3}{2} - 1 = \frac{1}{2}$ $\therefore X = 30^\circ$

Problem number [21]

$\because X \sin 30^\circ \cos^2 45^\circ = \sin^2 60^\circ$

$\therefore X\times\frac{1}{2}\times\left(\frac{1}{\sqrt2}\right)^2 = \left(\frac{\sqrt3}{2}\right)^2$ $\therefore X = \frac{\frac{3}{4}}{\frac{1}{2}\times\frac{1}{2}} = 3$

Problem number [22]

$\because \sin^2 45^\circ = \cos E \tan 30^\circ$

$\therefore \left(\frac{1}{\sqrt2}\right)^2 = \cos E \times \frac{1}{\sqrt3}$

$\therefore \cos E = \frac{\sqrt3}{2}$ $\therefore E = 30^\circ$

Problem number [23]

$\because 2\cos(X + 15^\circ) = \sqrt2$ $\therefore \cos(X + 15^\circ) = \frac{\sqrt2}{2}$

$\therefore X + 15^\circ = 45^\circ$ $\therefore X = 30^\circ$

$\therefore \tan 2X - \sin 2X = \tan 60^\circ - \sin 60^\circ$

$= \sqrt3 - \frac{\sqrt3}{2} = \frac{\sqrt3}{2}$

Problem number [24]

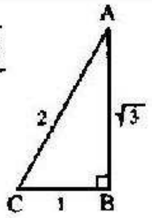
$\because \sin\theta \sin 45^\circ \cos 45^\circ \tan 60^\circ = \tan^2 45^\circ - \cos^2 60^\circ$

$\therefore \sin\theta \times \frac{1}{\sqrt2}\times\frac{1}{\sqrt2}\times\sqrt3 = (1)^2 - \left(\frac{1}{2}\right)^2$

$\therefore \sin\theta = \frac{1-\frac{1}{4}}{\frac{\sqrt3}{2}} = \frac{\sqrt3}{2}$ $\therefore \theta = 60^\circ$

Problem number [25]

$\because 2\,AB = \sqrt{3}\,AC \qquad \therefore \frac{AB}{AC} = \frac{\sqrt{3}}{2}$



let $AB = \sqrt{3}$ length unit

, $AC = 2$ length unit

$\therefore BC = 1$ length unit

$\therefore \sin C = \frac{\sqrt{3}}{2}$, $\cos C = \frac{1}{2}$, $\tan C = \sqrt{3}$

Problem number [26]

$\because m(\angle B) = 90^\circ$

(1) $\therefore (AB)^2 = (5)^2 - (3)^2 = 16 \qquad \therefore AB = 4$ cm.

(2) $\cos A \sin C - \sin A \cos C = \frac{4}{5} \times \frac{4}{5} - \frac{3}{5} \times \frac{3}{5}$

$= \frac{16}{25} - \frac{9}{25} = \frac{7}{25}$

Problem number [27]

$\because m(\angle C) = 90^\circ \qquad \therefore (AC)^2 = (10)^2 - (8)^2 = 36$

$\therefore AC = 6$ cm.

(1) $\tan B \times \tan A = \frac{6}{8} \times \frac{8}{6} = 1$

(2) $\because \cos B = \frac{8}{10}$

$\therefore m(\angle B) \simeq 36^\circ\ 52'\ 12''$

Problem number [28]

(1) $\because \tan C = \frac{AB}{BC} \qquad \therefore \frac{3}{4} = \frac{6}{BC}$

$\therefore BC = \frac{4 \times 6}{3} = 8$ cm.

, $\because m(\angle B) = 90^\circ$

$\therefore (AC)^2 = (8)^2 + (6)^2 = 100 \qquad \therefore AC = 10$ cm.

(2) $\sin A + \cos A = \frac{8}{10} + \frac{6}{10} = \frac{14}{10} = 1.4$

Problem number [29]

(1) In ΔABC : $\because m(\angle B) = 90^\circ$

, $\because m(\angle C) = 2\,m(\angle A)$

$\therefore m(\angle A) + 2\,m(\angle A) = 90^\circ$

$\therefore 3\,m(\angle A) = 90^\circ \qquad \therefore m(\angle A) = 30^\circ$

$\therefore m(\angle C) = 60^\circ$

(2) $\sin A + \cos C = \sin 30^\circ + \cos 60^\circ = \frac{1}{2} + \frac{1}{2} = 1$

Problem number [30]

In ΔABC :

$\because m(\angle B) = 90^\circ$ (properties of rectangle)

$\therefore (BC)^2 = (25)^2 - (15)^2 = 400 \qquad \therefore BC = 20$ cm.

(1) $\because \sin(\angle ACB) = \frac{15}{25} = \frac{3}{5}$

$\therefore m(\angle ACB) \simeq 36^\circ\ 52'\ 12''$

(2) The area of the rectangle $ABCD = 15 \times 20$

$= 300\ cm^2$

Problem number [31]

In ΔXYZ :

$\because m(\angle Y) = 90^\circ$ (properties of rectangle)

$\therefore \sin 43^\circ = \frac{XZ}{XZ} = \frac{XY}{10}$

$\therefore XY = 10 \sin 43^\circ \simeq 6.8$ cm.

, $\cos 43^\circ = \frac{XZ}{XZ} = \frac{YZ}{10}$

$\therefore YZ = 10 \cos 43^\circ \simeq 7.3$ cm.

$\therefore$ The perimeter of $\Delta XYZ = 10 + 6.8 + 7.3$

$= 24.1$ cm.

Problem number [32]

In ΔABC : $\because m(\angle B) = 90^\circ$ (properties of rectangle)

$\therefore (BC)^2 = (5)^2 - (3)^2 = 16 \qquad \therefore BC = 4$ cm.

(1) The area of the rectangle $ABCD = 4 \times 3 = 12\ cm^2$.

(2) $\because \sin(\angle ACB) = \frac{AB}{AC} = \frac{3}{5}$

$\therefore m(\angle ACB) \simeq 36^\circ\ 52'\ 12''$

Problem number [33]

In ΔABC :

$\because AB = AC$, $\overline{AD} \perp \overline{BC}$

$\therefore D$ is the midpoint of $\overline{BC} \qquad \therefore BD = CD = 6$ cm.

In ΔADC : $\because m(\angle ADC) = 90^\circ$

$\therefore AD = \sqrt{(10)^2 - (6)^2} = 8$ cm.

(1) $\sin^2 C + \cos^2 C = \left(\frac{8}{10}\right)^2 + \left(\frac{6}{10}\right)^2$

$= \frac{64}{100} + \frac{36}{100} = 1$

(2) $\sin B + \cos C = \frac{8}{10} + \frac{6}{10} = \frac{14}{10} > 1$

Problem number [34]

$MN = \sqrt{(0-7)^2 + (4+3)^2}$

$= \sqrt{49+49} = \sqrt{98} = 7\sqrt{2}$ length unit

Problem number [35]

$\because AB = \sqrt{(-4-3)^2 + (1-2)^2}$

$= \sqrt{49+1} = \sqrt{50} = 5\sqrt{2}$ length unit

, $BC = \sqrt{(2+4)^2 + (-1-1)^2}$

$= \sqrt{36+4} = \sqrt{40} = 2\sqrt{10}$ length unit

, $AC = \sqrt{(2-3)^2 + (-1-2)^2}$

$= \sqrt{1+9} = \sqrt{10}$ length unit

, $\because (AB)^2 = (BC)^2 + (AC)^2$

$\therefore \Delta ABC$ is a right-angled triangle at C

, its area $= \frac{1}{2} \times 2\sqrt{10} \times \sqrt{10} = 10$ square unit

Problem number [36]

$\sin 30° = \frac{AD}{12}$

$AD = 12 \times \sin 30° = 6$ cm.

The area of $(\Delta ABC) = \frac{1}{2} \times AD \times BC$

The area of $(\Delta ABC) = \frac{1}{2} \times 6 \times 16 = 48$ cm^2.

Problem number [37]

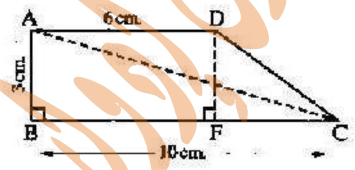
Draw $\overline{DF} \perp \overline{BC}$

$\therefore \overline{AD} \parallel \overline{BC}$, $\overline{AB} \perp \overline{BC}$, $\overline{DF} \perp \overline{BC}$

$\therefore$ ABFD is a rectangle $\quad \therefore BF = AD = 6$ cm.

$\therefore FC = 4$ cm. ,

$DF = AB = 3$ cm.



From Δ DFC which is right-angled at F :

$(DC)^2 = 3^2 + 4^2 = 25 \quad \therefore DC = 5$ cm.

$\therefore \cos(\angle DCB) - \tan(\angle ACB) = \frac{4}{5} - \frac{3}{10} = \frac{1}{2}$

Problem number [38]

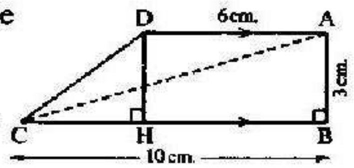
$\because \overline{AD} \parallel \overline{BH}$, $\overline{AB} \perp \overline{BH}$, $\overline{DH} \perp \overline{BH}$

$\therefore$ ABHD is a rectangle

$\therefore BH = AD = 6$ cm.

, $CH = 10 - 6 = 4$ cm.

, $DH = AB = 3$ cm.



In Δ DHC : $\because m(\angle CHD) = 90°$

$\therefore (CD)^2 = (4)^2 + (3)^2 = 25 \quad \therefore CD = 5$ cm.

$\therefore \cos(\angle DCB) - \tan(\angle ACB) = \frac{4}{5} - \frac{3}{10} = \frac{1}{2}$

Problem number [39]

$\because AB = \sqrt{(-1-1)^2 + (-2-4)^2}$

$= \sqrt{4+36} = \sqrt{40} = 2\sqrt{10}$ length unit

, $BC = \sqrt{(2+1)^2 + (-3+2)^2}$

$= \sqrt{9+1} = \sqrt{10}$ length unit

, $AC = \sqrt{(2-1)^2 + (-3-4)^2}$

$= \sqrt{1+49} = \sqrt{50} = 5\sqrt{2}$ length unit

$\therefore (AC)^2 = (AB)^2 + (BC)^2$

$\therefore \Delta ABC$ is a right-angled triangle at B

, its area $= \frac{1}{2} \times 2\sqrt{10} \times \sqrt{10} = 10$ square units.

Problem number [40]

$\because AB = \sqrt{(-4-1)^2 + (2+2)^2}$

$= \sqrt{25+16} = \sqrt{41}$ length unit

, $BC = \sqrt{(1+4)^2 + (6-2)^2}$

$= \sqrt{25+16} = \sqrt{41}$ length unit

, $AC = \sqrt{(1-1)^2 + (6+2)^2} = \sqrt{64} = 8$ length unit

$\therefore AB = BC \quad \therefore \Delta ABC$ is an isosceles triangle.

Problem number [41]

$\because AB = \sqrt{(1+2)^2 + (-1-3)^2}$

$= \sqrt{9+16} = \sqrt{25} = 5$ length unit

, $BC = \sqrt{(1-1)^2 + (7+1)^2} = \sqrt{64} = 8$ length unit

, $AC = \sqrt{(1+2)^2 + (7-3)^2}$

$= \sqrt{9+16} = \sqrt{25} = 5$ length unit

$\therefore AB = AC$

$\therefore \Delta ABC$ is an isosceles triangle

, the perimeter $= 5 + 8 + 5 = 18$ length unit

Problem number [42]

$\because AB = \sqrt{(3+2)^2 + (-1-4)^2}$

$= \sqrt{25+25} = \sqrt{50} = 5\sqrt{2}$ length unit

, $BC = \sqrt{(4-3)^2 + (5+1)^2}$

$= \sqrt{1+36} = \sqrt{37}$ length unit

$, AC = \sqrt{(4+2)^2 + (5-4)^2}$

$= \sqrt{36+1} = \sqrt{37}$ length unit

$\therefore BC = AC \quad \therefore \Delta ABC$ is an isosceles triangle

Problem number [43]

$\because MA = \sqrt{(-1-3)^2 + (2+1)^2}$

$= \sqrt{16+9} = \sqrt{25} = 5$ length unit

$, MB = \sqrt{(-1+4)^2 + (2-6)^2}$

$= \sqrt{9+16} = \sqrt{25} = 5$ length unit

$, MC = \sqrt{(-1-2)^2 + (2+2)^2}$

$= \sqrt{9+16} = \sqrt{25} = 5$ length unit

$\therefore MA = MB = MC$

$\therefore$ A , B and C lie on the circle M which its radius length is 5 length units

$\therefore$ The circumference of the circle

$= 2\pi r = 2 \times 3.14 \times 5 = 31.4$ length unit

Problem number [44]

$\because \sqrt{(2a-a)^2 + (-5-7)^2} = 13$

$\therefore \sqrt{a^2 + 144} = 13$ "squaring both sides"

$\therefore a^2 + 144 = 169 \qquad \therefore a^2 = 169 - 144$

$\therefore a^2 = 25 \qquad \therefore a = \pm\sqrt{25} = \pm 5$

Problem number [45]

$\because \sqrt{(x-6)^2 + (5-1)^2} = 2\sqrt{5}$ "squaring the two sides"

$\therefore (x-6)^2 + (4)^2 = 20$

$\therefore x^2 - 12x + 36 + 16 - 20 = 0$

$\therefore x^2 - 12x + 32 = 0 \qquad \therefore (x-4)(x-8) = 0$

$\therefore x = 4$ or $x = 8$

Problem number [46]

$\because \sqrt{(x+2)^2 + (7-3)^2} = 5$ "squaring the two sides"

$\therefore (x+2)^2 + (4)^2 = 25$

$\therefore x^2 + 4x + 4 + 16 - 25 = 0$

$\therefore x^2 + 4x - 5 = 0 \qquad \therefore (x+5)(x-1) = 0$

$\therefore x = -5$ or $x = 1$

Problem number [47]

$BC = \sqrt{(5-3)^2 + (1-2)^2} = \sqrt{4+1} = \sqrt{5}$ length unit

$\therefore AB = \sqrt{5}$ length unit

$\therefore \sqrt{(x-3)^2 + (3-2)^2} = \sqrt{5}$ "squaring the two sides"

$\therefore (x-3)^2 + (1)^2 = 5 \qquad \therefore x^2 - 6x + 9 + 1 - 5 = 0$

$\therefore x^2 - 6x + 5 = 0$

$\therefore (x-5)(x-1) = 0 \qquad \therefore x = 5$ or $x = 1$

Problem number [48]

The coordinates of $C = \left(\frac{3-5}{2}, \frac{-7-3}{2}\right) = (-1, -5)$

Problem number [49]

(1) $AB = \sqrt{(5-2)^2 + (3+1)^2} = \sqrt{9+16} = \sqrt{25}$

$= 5$ length unit

(2) $c = \left(\frac{2+5}{2}, \frac{-1+3}{2}\right) = \left(3\frac{1}{2}, 1\right)$

Problem number [50]

$\because$ C is the midpoint of $\overline{AB}$

$\therefore (-3, k) = \left(\frac{h+9}{2}, \frac{-6-11}{2}\right)$

$\therefore k = \frac{-6-11}{2} = -8\frac{1}{2}, \frac{h+9}{2} = -3$

$\therefore h + 9 = -6 \qquad \therefore h = -15$

Problem number [51]

$\because$ C is the midpoint of $\overline{AB}$

$\therefore (4, 6) = \left(\frac{x+6}{2}, \frac{3+y}{2}\right)$

$\therefore \frac{x+6}{2} = 4 \qquad \therefore x + 6 = 8 \qquad \therefore x = 2$

$, \frac{3+y}{2} = 6 \qquad \therefore 3 + y = 12 \qquad \therefore y = 9$

Problem number [52]

$\because \overline{AB}$ is a diameter in the circle M

$\therefore$ M is the midpoint of $\overline{AB}$

Let $A(x, y) \therefore (5, 7) = \left(\frac{x+8}{2}, \frac{y+11}{2}\right)$

$\therefore \frac{x+8}{2} = 5 \quad \therefore x + 8 = 10 \quad \therefore x = 2$

$, \frac{y+11}{2} = 7 \quad \therefore y + 11 = 14$

$\therefore y = 3 \quad \therefore A(2, 3)$

Problem number [53]

$\because \overline{AD}$ is a median in ΔABC

$\therefore$ D is the midpoint of $\overline{BC}$

$\therefore D = \left(\frac{3-3}{2}, \frac{2+6}{2}\right) = (0, 4)$

, $\because$ M is the midpoint of $\overline{AD}$

$\therefore M = \left(\frac{0+0}{2}, \frac{8+4}{2}\right) = (0, 6)$

Problem number [54]

$\because AB = \sqrt{(3+3)^2 + (4-0)^2} = \sqrt{36+16} = \sqrt{52}$

$= 2\sqrt{13}$ length unit

, $BC = \sqrt{(1-3)^2 + (-6-4)^2} = \sqrt{4+100} = \sqrt{104}$

$= 2\sqrt{26}$ length unit

, $AC = \sqrt{(1+3)^2 + (-6-0)^2}$

$= \sqrt{16+36} = \sqrt{52} = 2\sqrt{13}$ length unit

$\therefore AB = AC$ $\quad \therefore \Delta ABC$ is an isosceles triangle.

Let $\overline{AD} \perp \overline{BC}$

, $\because AB = AC$ $\quad \therefore$ D is the midpoint of $\overline{BC}$

$\therefore D = \left(\frac{3+1}{2}, \frac{4-6}{2}\right) = (2, -1)$

$\therefore AD = \sqrt{(2+3)^2 + (-1-0)^2}$

$= \sqrt{25+1} = \sqrt{26}$ length unit

Problem number [55]

$\because$ In the parallelogram the two diagonals bisect each other.

$\therefore$ Let M be the point of intersection of the two diagonals.

$\therefore$ The coordinates of $M = \left(\frac{3+0}{2}, \frac{2-3}{2}\right)$

$= \left(1\frac{1}{2}, -\frac{1}{2}\right)$

Let $D(x, y)$

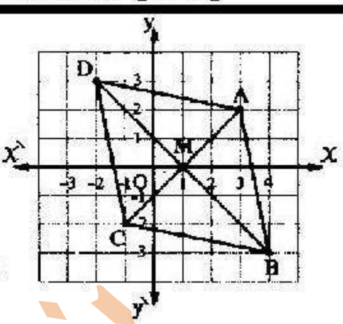
$\therefore \left(1\frac{1}{2}, -\frac{1}{2}\right) = \left(\frac{4+x}{2}, \frac{-5+y}{2}\right)$ $\quad \therefore \frac{4+x}{2} = 1\frac{1}{2}$

$\therefore 4 + x = 3$ $\quad \therefore x = -1$

, $\frac{-5+y}{2} = -\frac{1}{2}$ $\quad \therefore -5 + y = -1$ $\quad \therefore y = 4$

$\therefore D(-1, 4)$

Problem number [56]



$\because$ The two diagonals of the rhombus bisect each other

(1) Let M be the point of intersection of the two diagonals

$\therefore$ the coordinates of $M = \left(\frac{3-1}{2}, \frac{2-2}{2}\right) = (1, 0)$

(2) $\because AC = \sqrt{(-1-3)^2 + (-2-2)^2}$

$= \sqrt{16+16} = \sqrt{32} = 4\sqrt{2}$ length unit

, $BD = \sqrt{(-2-4)^2 + (3+3)^2}$

$= \sqrt{36+36} = \sqrt{72} = 6\sqrt{2}$ length unit

The area of the rhombus ABCD

$= \frac{1}{2} \times 4\sqrt{2} \times 6\sqrt{2} = 24$ square unit

(3) $\because$ The two diagonals of the rhombus are perpendicular

$\therefore$ In ΔAMB which is right at M

$\tan(\angle ABM) = \frac{AM}{BM} = \frac{2\sqrt{2}}{3\sqrt{2}} = \frac{2}{3}$

$\therefore m(\angle ABM) \simeq 33° \, 41' \, 24''$

$\because$ The diagonals of the rhombus bisect its angles.

$\therefore m(\angle ABC) = 2\, m(\angle ABM) = 2 \times 33° \, 41' \, 24''$

$= 67° \, 22' \, 48''$

Problem number [57]

$\because m_1 = \frac{3\sqrt{3} - 2\sqrt{3}}{5-4} = \sqrt{3}$, $m_2 = \tan 60° = \sqrt{3}$

$\therefore m_1 = m_2$

$\therefore$ The two straight lines are parallel.

Problem number [58]

$\because m_1 = \frac{6-5}{2-3} = -1$, $m_2 = \tan 45° = 1$

$\therefore m_1 \times m_2 = -1 \times 1 = -1$

$\therefore$ The two straight lines are perpendicular.

Problem number [59]

$\because m_1 = \frac{-5-2}{4+3} = -1$, $m_2 = \tan 45° = 1$

$\therefore m_1 \times m_2 = -1 \times 1 = -1$

$\therefore$ The two straight lines are perpendicular.

Problem number [60]

$\because AB = \sqrt{(1-5)^2 + (-3-1)^2}$

$= \sqrt{16+16} = \sqrt{32} = 4\sqrt{2}$ length unit

, $BC = \sqrt{(-5-1)^2 + (3+3)^2}$

$= \sqrt{36+36} = \sqrt{72} = 6\sqrt{2}$ length unit

, $CD = \sqrt{(-1+5)^2 + (7-3)^2}$

$= \sqrt{16+16} = \sqrt{32} = 4\sqrt{2}$ length unit

, $AD = \sqrt{(-1-5)^2 + (7-1)^2} = \sqrt{36+36}$

$= \sqrt{72} = 6\sqrt{2}$ length unit

$\therefore AB = CD$, $AD = BC$

$\therefore$ ABCD is a parallelogram

, $\because AC = \sqrt{(-5-5)^2 + (3-1)^2}$

$= \sqrt{100+4} = \sqrt{104} = 2\sqrt{26}$ length unit

, $BD = \sqrt{(-1-1)^2 + (7+3)^2}$

$= \sqrt{4+100} = \sqrt{104} = 2\sqrt{26}$ length unit

$\therefore AC = BD$ $\qquad \therefore$ ABCD is a rectangle

Problem number [61]

$\because \overleftrightarrow{AB}$ // the x-axis $\qquad \therefore$ The slope of $\overleftrightarrow{AB} = 0$

$\therefore \frac{y+4}{-2-5} = 0 \qquad \therefore y + 4 = 0 \qquad \therefore y = -4$

Problem number [62]

$\because m_1 = \frac{3-k}{1-0} = 3 - k$, $m_2 = \frac{5-3}{2-1} = 2$

$\because m_1 = m_2 \qquad \therefore 3 - k = 2 \qquad \therefore k = 1$

Problem number [63]

$\because L_1 // L_2 \qquad \because m_1 = m_2$

$\therefore \tan 45° = \frac{-a}{-2} \qquad \therefore 1 = \frac{a}{2} \qquad \therefore a = 2$

Problem number [64]

$m_1 = \frac{k-1}{2+3} = \frac{k-1}{5}$, $m_2 = \tan 45° = 1$

, $\because L_1 \perp L_2 \qquad \therefore m_1 \times m_2 = -1$

$\therefore \frac{k-1}{5} \times 1 = -1 \qquad \therefore k - 1 = -5 \qquad \therefore k = -4$

Problem number [65]

$y = \frac{1}{2}x + 2$

Problem number [66]

$\because$ The slope $= \frac{1}{2}$

$\therefore$ The equation of the straight line is : $y = \frac{1}{2}x + c$

, $\because$ (4 , 7) satisfies the equation

$\therefore 7 = \frac{1}{2} \times 4 + c \qquad \therefore c = 5$

$\therefore$ The equation of the straight line is : $y = \frac{1}{2}x + 5$

Problem number [67]

$\because$ The slope $= \frac{3}{4}$

$\therefore$ The equation of the straight line is : $y = \frac{3}{4}x + c$

$\because$ (3 , −5) satisfies the equation

$\therefore -5 = \frac{3}{4} \times 3 + c \qquad \therefore c = -7\frac{1}{4}$

$\therefore$ The equation of the straight line is : $y = \frac{3}{4}x - 7\frac{1}{4}$

Problem number [68]

$\because$ The slope of the straight line $= \frac{-1+3}{5-2} = \frac{2}{3}$

$\therefore$ The equation of the straight line is : $y = \frac{2}{3}x + c$

, $\because$ (2 , −3) satisfies the equation

$\therefore -3 = \frac{2}{3} \times 2 + c \qquad \therefore c = -4\frac{1}{3}$

$\therefore$ The equation of the straight line is :

$y = \frac{2}{3}x - 4\frac{1}{3}$

Problem number [69]

$\because$ The slope of $\overleftrightarrow{AB} = \frac{5-3}{3-1} = 1$

$\therefore$ The slope of the axis of symmetry of $\overline{AB} = -1$

$\therefore$ The equation of the axis of symmetry of $\overleftrightarrow{AB}$ is :

$y = -x + c$

, $\because$ The midpoint of $\overline{AB} = \left(\frac{1+3}{2}, \frac{3+5}{2}\right)$

$= (2 , 4)$

$\therefore$ (2 , 4) satisfies the equation : $y = -x + C$

$\therefore 4 = -2 + c \qquad \therefore c = 6$

$\therefore$ The equation of the axis of symmetry of $\overleftrightarrow{AB}$ is :

$y = -x + 6$

Problem number [70]

∵ The slope of the straight line $= \frac{6-2}{-1-1} = -2$

∴ The equation of the straight line is : $y = -2x + c$

, ∵ The straight line passes through the point (1 , 2)

∴ $2 = -2 \times 1 + c$ ∴ $c = 4$

∴ The equation of the straight line is :

$y = -2x + 4$

Problem number [71]

∵ The slope of the straight line $= \frac{2-3}{-3-2} = \frac{1}{5}$

∴ The equation of the straight line is :

$y = \frac{1}{5}x + c$

, ∵ (2 , 3) satisfies the equation

∴ $3 = \frac{1}{5} \times 2 + c$ ∴ $c = 2\frac{3}{5}$

∴ The equation of the straight line is :

$y = \frac{1}{5}x + 2\frac{3}{5}$

Problem number [72]

∵ The slope of $\overleftrightarrow{AB} = \frac{-2-4}{-1-1} = 3$

∴ The slope of $\overleftrightarrow{BC} = -\frac{1}{3}$

∴ The equation of $\overleftrightarrow{BC}$ is : $y = -\frac{1}{3}x + c$

, ∵ B (−1 , −2) satisfies the equation of $\overleftrightarrow{BC}$

∴ $-2 = -\frac{1}{3} \times -1 + c$ ∴ $c = -2\frac{1}{3}$

∴ The equation of $\overleftrightarrow{BC}$ is : $y = \frac{-1}{3}x - 2\frac{1}{3}$

Problem number [73]

∵ The slope of the given straight line $= \frac{-1}{2}$

∴ The slope of the required straight line $= -\frac{1}{2}$

∴ The equation of the required straight line is :

$y = -\frac{1}{2}x + c$

∵ The straight line passes through the point :

(3 , −5)

∴ $-5 = \frac{-1}{2} \times 3 + c$ ∴ $c = -3\frac{1}{2}$

∴ The equation of the required straight line is :

$y = -\frac{1}{2}x - 3\frac{1}{2}$

Problem number [74]

∵ The slope of the given straight line $= \frac{-2}{-1} = 2$

∴ The slope of the required straight line = 2

∴ The equation of the required straight line is :

$y = 2x + c$

∵ (2 , 3) satisfies the equation

∴ $3 = 2 \times 2 + c$ ∴ $c = -1$

∴ The equation of the required straight line is :

$y = 2x - 1$

Problem number [75]

∵ The slope of the given straight line $= \frac{-1}{2}$

∴ The slope of the required straight line = 2

∴ The equation of the required straight line is :

$y = 2x + c$

∵ (3 , −5) satisfies the equation

∴ $-5 = 2 \times 3 + c$ ∴ $c = -11$

∴ The equation of the required straight line is :

$y = 2x - 11$

Problem number [76]

∵ The slope of the given straight line $= \frac{-5}{-2} = \frac{5}{2}$

∴ The slope of the required straight line $= \frac{-2}{5}$

∴ The equation of the required straight line is :

$y = \frac{-2}{5}x + c$

, ∵ (3 , 4) satisfies the equation

∴ $4 = -\frac{2}{5} \times 3 + c$ ∴ $c = 5\frac{1}{5}$

∴ The equation of the required straight line is :

$y = \frac{-2}{5}x + 5\frac{1}{5}$

Problem number [77]

∴ The slope of the required straight line = 2

∴ The equation of the required straight line is :

$y = 2x + c$

, ∵ (1 , 5) satisfies the equation

∴ $5 = 2 \times 1 + c$ ∴ $c = 3$

∴ The equation of the required straight line is :

$y = 2x + 3$

Problem number [78]

$\because$ The slope of the given straight line $= \frac{-4+3}{5-2}$

$= -\frac{1}{3}$

$\therefore$ The slope of the required straight line = 3

$\therefore$ The equation of the required straight line is :

$y = 3x + c$

, $\because$ (1 , 2) satisfies the equation

$\therefore 2 = 3 \times 1 + c$ $\quad \therefore c = -1$

$\therefore$ The equation of the required straight line is :

$y = 3x - 1$

Problem number [79]

$\because$ The midpoint of $\overline{AB} = \left(\frac{1+3}{2}, \frac{-2-4}{2}\right) = (2, -3)$

$\therefore$ The slope of the straight line $= \frac{6+3}{1-2} = -9$

$\therefore$ The equation of the straight line is : $y = -9x + c$

, $\because$ (1 , 6) satisfies the equation

$\therefore 6 = -9 \times 1 + c$ $\quad \therefore c = 15$

$\therefore$ The equation of the straight line is :

$y = -9x + 15$

Problem number [80]

(1) $y = \frac{1}{2}x + 2$

(1) Put $y = 0$ $\quad \therefore 0 = \frac{1}{2}x + 2$

$\therefore \frac{1}{2}x = -2$ $\quad \therefore x = -4$

$\therefore$ The intersection point with the x-axis is (−4 , 0)

Problem number [81]

$\because$ The slope of $\overleftrightarrow{AC} = \frac{6-4}{-1-5} = -\frac{2}{6} = -\frac{1}{3}$

, $\because$ The two diagonals of the square are perpendicular.

$\therefore$ The slope of $\overleftrightarrow{BD} = 3$

$\therefore$ The equation of $\overleftrightarrow{BD}$ is : $y = 3x + c$

$\because$ The coordinates of the midpoint of $\overline{AC}$

$= \left(\frac{5-1}{2}, \frac{6+4}{2}\right) = (2, 5)$

$\therefore$ (2 , 5) satisfies the equation of $\overleftrightarrow{BD}$

$\therefore 5 = 2 \times 3 + c$ $\quad \therefore c = -1$

$\therefore$ The equation of $\overleftrightarrow{BD}$ is : $y = 3x - 1$

Problem number [82]

(1) $\because$ $\overline{AB}$ is a diameter of the circle

, M is the midpoint of $\overline{AB}$ let A (x , y)

$\therefore (5, 7) = \left(\frac{x+8}{2}, \frac{y+11}{2}\right)$ $\quad \therefore \frac{x+8}{2} = 5$

$\therefore x + 8 = 10$ $\quad \therefore x = 2$ $\quad , \frac{y+11}{2} = 7$

$\therefore y + 11 = 14$ $\quad \therefore y = 3$ $\quad \therefore$ A (2 , 3)

(2) $\because$ The slope of $\overleftrightarrow{AB} = \frac{11-3}{8-2} = \frac{4}{3}$

$\therefore$ The slope of the required straight line $= \frac{-3}{4}$

$\therefore$ The equation of the required straight line is :

$y = \frac{-3}{4}x + c$

$\because$ B (8 , 11) satisfies the equation

$\therefore 11 = \frac{-3}{4} \times 8 + c$ $\quad \therefore c = 17$

$\therefore$ The equation of the required straight line is :

$y = \frac{-3}{4}x + 17$

Problem number [83]

$\because$ In the parallelogram the two diagonals bisect each other.

$\therefore$ The coordinates of M $= \left(\frac{3+0}{2}, \frac{2-3}{2}\right)$

$= \left(1\frac{1}{2}, -\frac{1}{2}\right)$

Let D (x , y)

$\therefore \left(1\frac{1}{2}, -\frac{1}{2}\right) = \left(\frac{4+x}{2}, \frac{-5+y}{2}\right)$

$\therefore \frac{4+x}{2} = 1\frac{1}{2}$ $\quad \therefore 4 + x = 3$ $\quad \therefore x = -1$

, $\frac{-5+y}{2} = -\frac{1}{2}$ $\quad \therefore -5 + y = -1$ $\quad \therefore y = 4$

$\therefore$ D (−1 , 4)

Problem number [84]

$\because$ The slope of $\overleftrightarrow{BC} = \frac{4+2}{3-5} = -3$

$\therefore$ The slope of $\overleftrightarrow{DE} = -3$

$\therefore$ The equation of $\overleftrightarrow{DE}$ is : $y = -3x + c$

$\because$ D is the midpoint of $\overline{AB} = \left(\frac{1+5}{2}, \frac{2-2}{2}\right) = (3, 0)$

$\therefore$ (3 , 0) satisfies the equation of $\overleftrightarrow{DE}$

$\therefore 0 = -3 \times 3 + c$ $\quad \therefore c = 9$

$\therefore$ The equation of $\overleftrightarrow{DE}$ is : $y = -3x + 9$

Problem number [85]

$\because m_1 = \frac{-1}{1} = -1$, $m_2 = \frac{-k}{3}$,

$\because$ The two straight lines are parallel

$\therefore m_1 = m_2$ $\therefore -1 = -\frac{k}{3}$ $\therefore k = 3$

Problem number [86]

The slope $= \frac{-3}{4}$

, the length of the intercepted part of y-axis

$= \left|\frac{-5}{4}\right| = \frac{5}{4}$ length unit

Problem number [87]

$\because$ Let the measure of the two angles be : $3x$, $5x$

$\therefore 3x + 5x = 180°$ $\therefore 8x = 180°$ $\therefore x = 22°\ 30'$

$\therefore$ The measure of the two angles are :

$67°\ 30'$, $112°\ 30'$

Problem number [88]

$\because \frac{x}{2} + 3y = 6$ $\therefore 3y = -\frac{x}{2} + 6$

$\therefore y = -\frac{x}{6} + 2$ $\therefore$ The slope $= -\frac{1}{6}$

and the intercepted part is 2 units from the positive part of y-axis.

Problem number [89]

$\because \frac{x}{3} + \frac{y}{2} = 1$ "multiplying by 2"

$\therefore \frac{2x}{3} + y = 2$ $\therefore y = -\frac{2x}{3} + 2$

$\therefore$ The slope $= \frac{-2}{3}$

, the intercepted part = 2 units from the positive part of y-axis

Problem number [90]

(1) $\because$ The slope of the straight line $= \frac{3-1}{2-1} = 2$

$\therefore$ The equation of the straight line is : $y = 2x + c$

$\because$ The point $(1, 1) \in$ the straight line

$\therefore 1 = 2 \times 1 + c$ $\therefore c = -1$

$\therefore$ The equation of the straight line is : $y = 2x - 1$

(2) One unit of the negative part of y-axis

(3) $\because$ The point (3 , a) satisfies the equation

$\therefore a = 2 \times 3 - 1 = 5$

Problem number [91]

(1) $\because$ The slope of $L_1 = \tan 45° = 1$

, $\because L_1$ passes through the origin point :

$\therefore$ The equation of L_1 is : $y = x$

(2) $\because L_1 // L_2$ $\therefore$ The slope of $L_2 = 1$

$\therefore$ The equation of L_2 is : $y = x + c$

, $\because$ (1 , 5) satisfies the equation of L_2 :

$\therefore 5 = 1 + c$ $\therefore c = 4$

$\therefore$ The equation of L_2 is : $y = x + 4$

(3) Let B (x , y)

$\because$ B satisfies the equation of L_1 : $\therefore x = y$

, $\because \overline{AB} \perp L_1$ $\therefore$ The slope of $\overleftrightarrow{AB} = -1$

$\therefore \frac{y-5}{x-1} = -1$ $\therefore y - 5 = 1 - x$

, $\because x = y$ $\therefore x - 5 = 1 - x$

$\therefore 2x = 6$ $\therefore x = 3$

$\therefore y = 3$ $\therefore$ B (3 , 3)

$\therefore AB = \sqrt{(3-1)^2 + (3-5)^2}$

$= \sqrt{4+4} = \sqrt{8} = 2\sqrt{2}$ length unit

Problem number [92]

(1) Let A $(x , 0)$, B $(0 , y)$

$\because$ C is the midpoint of $\overline{AB}$

$\therefore (4 , 3) = \left(\frac{x+0}{2} , \frac{0+y}{2}\right)$

$\therefore \frac{x}{2} = 4$ $\therefore x = 8$ $\therefore$ A (8 , 0)

$\therefore \frac{y}{2} = 3$ $\therefore y = 6$ $\therefore$ B (0 , 6)

(2) The slope of $\overleftrightarrow{AB} = \frac{0-6}{8-0} = -\frac{3}{4}$

$\therefore$ The equation of $\overleftrightarrow{AB}$ is : $y = -\frac{3}{4}x + c$

$\because$ (0 , 6) statisfies the equation of $\overleftrightarrow{AB}$

$\therefore 6 = -\frac{3}{4} \times 0 + c$ $\therefore c = 6$

$\therefore$ The equation of $\overleftrightarrow{AB}$ is : $y = -\frac{3}{4}x + 6$

Choose the correct answer:

1) $\tan 45^\circ = \dots$ [1 , $2\sqrt{2}$, $\frac{1}{2}$, $\sqrt{2}$]

2) If $\sin X = \frac{1}{2}$, X is an acute angle, then $m(\angle X) = \dots$ [45° , 60° , 30° , 90°]

3) The distance between the two points $(3,0)$ and $(0,-4)$ $= \dots$ length units [4 , 5 , 6 , 7]

4) If $x + y = 5$, $kx + 2y = 0$ are perpendicular, then $k = \dots$ [-2 , -1 , 1 , 2]

5) If $A(5,7)$, $B(1,-1)$, then the midpoint of $\overline{AB}$ is... [$(2,3)$, $(3,3)$, $(3,2)$, $(3,4)$]

6) If $\cos x = \frac{\sqrt{3}}{2}$, x is an acute angle, then $\sin 2x = \dots$ [1 , $\frac{\sqrt{3}}{2}$, -2 , $\frac{1}{\sqrt{3}}$]

7) The equation of the straight line which passes through the point $(3,-5)$ and parallel to y-axis is... [$x = 3$, $y = -5$, $y = 2$, $x = -5$]

8) $2 \sin 30^\circ \tan 60^\circ = \dots$ [$\sqrt{3}$, 3 , $\frac{\sqrt{3}}{3}$, $\frac{1}{2}$]

9) The equation of the straight line which passes through the point $(-2,-3)$ and parallel to x-axis is... [$x = -2$, $x = -3$, $y = -2$, $y = -3$]

10) A circle of centre at the origin point and its radius length is 2 length unit, which of the following points belongs to the circle? [$(1,-2)$, $(-2,\sqrt{5})$, $(\sqrt{3},1)$, $(0,1)$]

11) The perpendicular distance between the two straight lines: $x - 2 = 0$, $x + 3 = 0$ equals... length units. [1 , 5 , 2 , 3]

12) If $\frac{-3}{2}$, $\frac{6}{k}$ are the slopes of two parallel straight lines, then $k = \dots$ [6 , -4 , $\frac{3}{2}$, 2]

13) The distance between the point $(4,3)$ and x-axis is... [-3 , 3 , 4 , -4]

14) $4 \cos 30^\circ \tan 60^\circ = \dots$ [3 , $2\sqrt{3}$, 6 , 12]

15) The points $(0,1)$, $(3,0)$ and $(0,4)$ ...

(a) form a right-angled triangle (b) form an acute-angled triangle

(c) form an obtuse-angled triangle (d) are collinear

(16) If $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$ and the slope of $\overleftrightarrow{AB} = \frac{3}{3}$, then the slope of $\overleftrightarrow{CD} = \dots$

[$\frac{2}{3}$, $\frac{3}{2}$, $\frac{-2}{3}$, $\frac{-3}{2}$]

(17) If $\sin x = \frac{1}{2}$, x is an acute angle then $\sin 2x = \dots$

[1 , $\frac{1}{4}$, $\frac{\sqrt{3}}{2}$, $\frac{1}{\sqrt{3}}$]

(18) If $x + y = 5$, $kx + 2y = 0$ are parallel, then $k = \dots$

[-2 , -1 , 1 , 2]

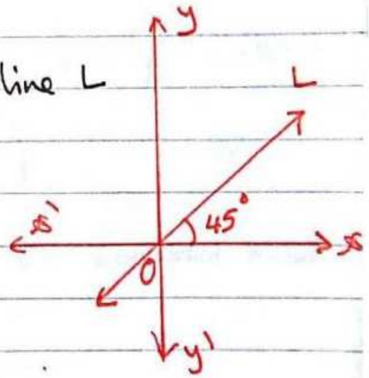
(19) If $\sin\theta = \cos\theta$, then $m(\angle\theta) = \dots^\circ$

[30 , 45 , 60 , 75]

(20) In the opposite figure:
The equation of the straight line L is ...

(a) $x = 1$ (b) $y = 1$

(c) $y = x$ (d) $y = -x$



Answer the following questions:

(1) Without using calculator prove that:
$\sin 60^\circ = 2\sin 30^\circ \cos 30^\circ$

(2) Prove that: the points $A(-3,-1)$, $B(6,5)$ and $C(3,3)$ are collinear.

(3) If $4\cos 60^\circ \sin 30^\circ = \tan x$ find the value of x, where x is an acute angle.

(4) If the midpoint of $\overline{AB}$ is $C(6,-4)$ where $A(5,-3)$ find the point: B

(5) If the straight line L_1 passes through the points $(3,1)$, $(2,K)$ and the straight line L_2 makes with the positive direction of the x-axis an angle of measure 45° find the value of K if $L_1 \parallel L_2$

(6) ABC is a right-angled triangle at C, AC = 6 cm, BC = 8 cm
Find (1) $\cos A \cos B - \sin A \sin B$
(2) $m(\angle B)$

(7) Find the equation of the straight line whose slope is 2 and passes through the point $(1,0)$

8) prove that: the points A(3, -1), B(-4, 6) and C(2, -2) which belong to an arthogonal certesian coordinates plane lie on the circle whose centre is M(-1, 2). Find the circumference of the circle.

9) If $\cos E \tan 30^\circ = \cos^2 45^\circ$, find m(∠E), E is an acute angle.

10) Show the type of the triangle whose verticies are A(3,3), B(1,5) and C(1,3) due to its side lengths.

11) Find the equation of straight line which passes through the points (1,3) and (-1,-3) and prove that it is passing through the origin point.

12) If the points (3,1) is the midpoint of (1,y), (x,3), find the point (x,y).

13) Find the equation of the straight line which intercepts the two axes two positive parts of lengths 1 and 4 for x and y axes respectively and find its slope.

14) ABC is a right-angled triangle at B, AC = 10 cm. and BC = 8 cm
prove that: $\sin^2 A + 1 = 2\cos^2 C + \cos^2 A$

15) prove that: the straight line which passes through the points (-1, 3), (2, 4) parallel to the straight line: $3y - x - 1 = 0$

16) ABCD is a trapezium, $\overline{AD} \parallel \overline{BC}$, m(∠B) = 90°, AB = 3 cm, BC = 6 cm. and AD = 2 cm
Find the length of $\overline{DC}$ and value of cos(∠BCD)

17) If the straight line which is passing through the two points: (3,0) and (0,a) and the straight line whose equation is: $x - y + 1 = 0$ are perpendicular, then find the value of a

18) ABCD is a parallelogram, its two diagonals intersects at E where:
A(3, -1), B(6, 2) and C(1, 7) Find the coordinates of the points E and D.

19) In the opposite figure:
If C(1,2) is the midpoint of $\overline{AB}$, then find:
(1) the coordinates of each of A and B
(2) the area of triangle OAB

20) In the opposite figure: ABO is an equilateral triangle, C is the midpoint of $\overline{AB}$
Find: the equation of the straight line $\overleftrightarrow{OC}$.

THE SOLUTIONS

1) $\tan 45^\circ = \ldots$ [1 , $2\sqrt{2}$, $\frac{1}{2}$, $\sqrt{2}$]

2) If $\sin X = \frac{1}{2}$, X is an acute angle, then $m(\angle X) = \ldots$
[45° , 60° , 30° , 90°]

3) The distance between the two points $(3,0)$ and $(0,4)$ $= \ldots$ length units [4 , 5 , 6 , 7]

4) If $x+y=5$, $kx+2y=0$ are perpendicular, then $k = \ldots$ [-2 , -1 , 1 , 2]

5) If $A(5,7)$, $B(1,-1)$, then the midpoint of $\overline{AB}$ is...
[$(2,3)$, $(3,3)$, $(3,2)$, $(3,4)$]

6) If $\cos x = \frac{\sqrt{3}}{2}$, x is an acute angle, then $\sin 2x = \ldots$ [1 , $\frac{\sqrt{3}}{2}$, -2 , $\frac{1}{\sqrt{3}}$]

7) The equation of the straight line which passes through the point $(3,-5)$ and parallel to y-axis is... [$x=3$, $y=-5$, $y=2$, $x=-5$]

8) $2 \sin 30^\circ \tan 60^\circ = \ldots$ [$\sqrt{3}$, 3 , $\frac{\sqrt{3}}{3}$, $\frac{1}{2}$]

9) The equation of the straight line which passes through the point $(-2,-3)$ and parallel to x-axis is... [$x=-2$, $x=-3$, $y=-2$, $y=-3$]

10) A circle of centre at the origin point and its radius length is 2 length unit, which of the following points belongs to the circle?
[$(1,-2)$, $(-2,\sqrt{5})$, $(\sqrt{3},1)$, $(0,1)$]

11) The perpendicular distance between the two straight lines: $x-2=0$, $x+3=0$ equals... length units. [1 , 5 , 2 , 3]

12) If $\frac{-3}{2}$, $\frac{6}{k}$ are the slopes of two parallel straight lines, then $k = \ldots$ [6 , -4 , $\frac{3}{2}$, 2]

13) The distance between the point $(4,3)$ and x-axis is... [-3 , 3 , 4 , -4]

14) $4 \cos 30^\circ \tan 60^\circ = \ldots$ [3 , $2\sqrt{3}$, 6 , 12]

15) The points $(0,1)$, $(3,0)$ and $(0,4)$ ...

(a) form a right-angled triangle (b) form an acute-angled triangle

(c) form an obtuse-angled triangle (d) are collinear

(16) If $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$ and the slope of $\overleftrightarrow{AB} = \frac{2}{3}$, then the slope of $\overleftrightarrow{CD} = \dots$

[$\frac{2}{3}$, $\frac{3}{2}$, $\frac{-2}{3}$, $\frac{-3}{2}$]

(17) If $\sin x = \frac{1}{2}$, x is an acute angle then $\sin 2x = \dots$

[1 , $\frac{1}{4}$, $\frac{\sqrt{3}}{2}$, $\frac{1}{\sqrt{3}}$]

(18) If $x + y = 5$, $kx + 2y = 0$ are parallel, then $k = \dots$

[-2 , -1 , 1 , 2]

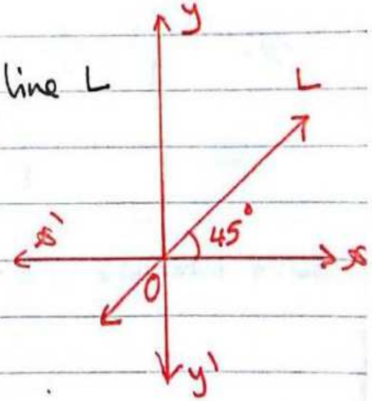
(19) If $\sin\theta = \cos\theta$, then $m(\angle\theta) = \dots^\circ$

[30 , 45 , 60 , 75]

(20) In the opposite figure:
The equation of the straight line L is ...

(a) $x = 1$ (b) $y = 1$

(c) $y = x$ (d) $y = -x$



ANSWER THE QUESTIONS

[1] Without using calculator prove that:
$\sin 60^\circ = 2\sin 30^\circ \cos 30^\circ$

Solution:

$L.H.S = \sin 60 = \frac{\sqrt{3}}{2}$ ... (1)

$R.H.S = 2 \times \frac{1}{2} \times \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{2}$ ... (2)

from 1, 2 $\therefore L.H.S = R.H.S$

[2] Prove that: the points $A(-3, -1)$, $B(6, 5)$ and $C(3, 3)$ are collinear.

Solution

The slope of $\overleftrightarrow{AB} = \frac{5+1}{6+3} = \frac{6}{9} = \frac{2}{3}$ ... (1)

the slope of $\overleftrightarrow{BC} = \frac{3-5}{3-6} = \frac{2}{3}$ ... (2)

from (1), (2) $\therefore \overleftrightarrow{AB} \parallel \overleftrightarrow{BC}$, $\because$ B is a common point

$\therefore$ A, B, C are collinear.

[3] If $4\cos 60^\circ \sin 30^\circ = \tan x$ find the value of x, where x is an acute angle.

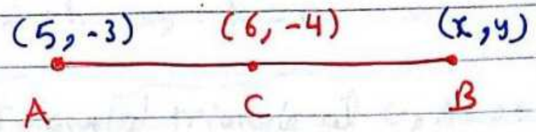
Solution:

$L.H.S = 4 \times \frac{1}{2} \times \frac{1}{2} = 1$

$\therefore \tan x = 1 \Rightarrow x = 45^\circ$

[4] If the midpoint of $\overline{AB}$ is $C(6,-4)$ where $A(5,-3)$ find the point : B

Solution



let $B(x, y)$

$\because \frac{x+5}{2} = 6$ | $\frac{-3+y}{2} = -4$

$x + 5 = 12$ | $-3 + y = -8$

$x = 12 - 5 = 7$ | $y = -5$

$\therefore B(7, -5)$

Another Solution:

$B = 2C - A$

$= 2(6,-4) - (5,-3)$

$= (12,-8) - (5,-3) = (7,-5)$

[5] If the straight line L_1 passes through the points $(3,1)$, $(2,K)$ and the straight line L_2 makes with the positive direction of the x-axis an angle of measure $45°$ find the value of K if $L_1 \parallel L_2$

Solution:

Slope of $L_1 = \frac{K-1}{2-3} = \frac{K-1}{-1}$

Slope of $L_2 = \tan 45 = 1$

$\because L_1 \parallel L_2 \quad \therefore$ the slope L_1 = the slope of L_2

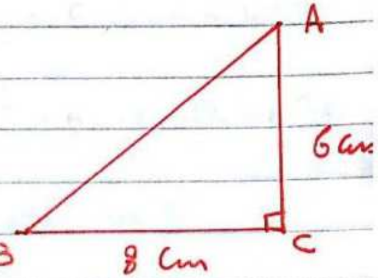
$\therefore \frac{K-1}{-1} = 1 \Rightarrow K - 1 = -1 \Rightarrow K = 0$

[6] ABC is a right-angled triangle at C, AC = 6 cm, BC = 8 cm

Find (1) $\cos A \cos B - \sin A \sin B$

(2) $m(\angle B)$

Solution:



$(AB)^2 = (6)^2 + (8)^2 = 100$

$\therefore AB = 10$ cm

(1) $\cos A \cos B - \sin A \sin B$

$= \frac{6}{10} \times \frac{8}{10} - \frac{8}{10} \times \frac{6}{10} = \frac{48}{100} - \frac{48}{100} = 0$

(2) $\because \cos B = \frac{8}{10} \Rightarrow$ shift cos $8/10$ = $\boxed{\text{°'''}}$

$\therefore m(\angle B) = 36° \; 52' \; 11.63''$

[7] Find the equation of the straight line whose slope is 2 and passes through the point (1,0)

Solution:

$\because m = 2$

$\therefore y = mx + c$

$\Rightarrow y = 2x + c \quad \because (1,0)$ verifying it

$\Rightarrow 0 = 2 \times 1 + c$

$\Rightarrow c = -2$

$\therefore \boxed{y = 2x - 2}$

8 prove that: the points A(3, -1), B(-4, 6) and C(2, -2) which belong to an orthogonal Cartesian Coordinates plane lie on the Circle whose Centre is M(-1, 2) Find the Circumference of the Circle.

Solution:

$MA = \sqrt{(-1-3)^2 + (2+1)^2} = 5$ length units

$MB = \sqrt{(-1+4)^2 + (2-6)^2} = 5$ length units

$MC = \sqrt{(-1-2)^2 + (2+2)^2} = 5$ length units

$\because MA = MB = MC = 5$ length units

$\therefore$ the points A, B, and C lie on the Circle M

the Circumference $= 2\pi r$

$= 2 \times 3.14 \times 5 = 31.4$ length units

9 If $\cos E \tan 30° = \cos^2 45°$, find $m(\angle E)$, E is an acute angle.

Solution:

$\cos E \times \frac{1}{\sqrt{3}} = (\frac{1}{\sqrt{2}})^2$

$\Rightarrow \cos E \times \frac{1}{\sqrt{3}} = \frac{1}{2}$ $\quad (\times \frac{\sqrt{3}}{1})$

$\cos E = \frac{\sqrt{3}}{2} \therefore m(\angle E) = 30°$

10 Show the type of the triangle whose vertices are A(3, 3), B(1, 5) and C(1, 3) due to its side lengths.

Solution:

$AB = \sqrt{(3-1)^2 + (3-5)^2} = 2\sqrt{2}$ length units

$BC = \sqrt{(1-1)^2 + (5-3)^2} = 2$ length units

$AC = \sqrt{(3-1)^2 + (3-3)^2} = 2$ length units

$\because AC = BC \neq AB$

the triangle is isosceles triangle

11 Find the equation of straight line which passes through the points (1, 3) and (-1, -3) and prove that it's passing through the origin point.

Solution:

the slope $= \frac{-3-3}{-1-1} = \frac{-6}{-2} = 3$

$\because y = mx + c \Rightarrow y = 3x + c$

$\because (1, 3)$ verifying the equation

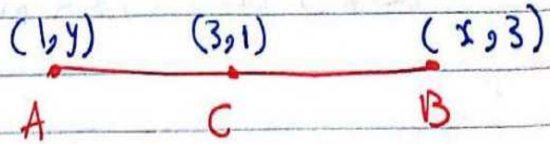
$\therefore 3 = 3 + c \Rightarrow c = 3 - 3 = 0$

$\therefore \boxed{y = 3x}$

$\because c = 0 \therefore$ the straight line passing through the origin

12) If the points $(3,1)$ is the midpoint of $(1,y)$, $(x,3)$, find the point (x,y).

Solution:



$$\frac{1+x}{2} = 3 \qquad \Bigg| \qquad \frac{y+3}{2} = 1$$

$1+x = 6 \quad x = 5 \qquad y+3 = 2 \quad y = -1$

$\Rightarrow (x,y) = (5,-1)$

13) Find the equation of the straight line which intercepts the two axes two positive parts of lengths 1 and 4 for x and y axes respectively and find its slope.

Solution:

the equation is $\frac{x}{a} + \frac{y}{b} = 1$

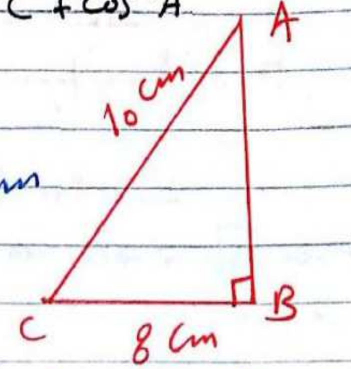
$$\Rightarrow \frac{x}{1} + \frac{y}{4} = 1$$

$\frac{y}{4} = -x + 1 \qquad (\times 4)$

$y = -4x + 4$

the slope $= -4$

14) ABC is a right-angled triangle at B, AC = 10 cm. and BC = 8 cm
prove that: $\sin^2 A + 1 = 2\cos^2 C + \cos^2 A$



Solution: $(AB)^2 = (10)^2 - (8)^2 = 36$

$\therefore AB = \sqrt{36} = 6$ cm

$L.H.S = \left(\frac{8}{10}\right)^2 + 1 = \frac{41}{25} \quad \ldots ①$

$R.H.S = 2\left(\frac{8}{10}\right)^2 + \left(\frac{6}{10}\right)^2 = 2 \times \frac{16}{25} + \frac{9}{25} = \frac{41}{25} \quad ②$

from 1, 2 L.H.S = R.H.S

15) prove that: the straight line which passes through the points $(-1,3)$, $(2,4)$ parallel to the straight line: $3y - x - 1 = 0$

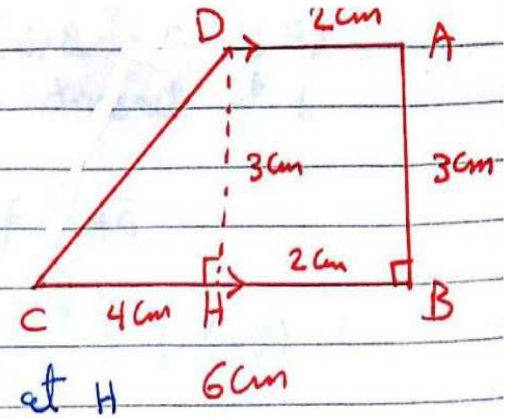
Solution:

$m_1 = \frac{4-3}{2+1} = \frac{1}{3} \qquad m_2 = \frac{1}{3}$

$\because m_1 = m_2 \quad \therefore L_1 \parallel L_2$

16) ABCD is a trapezium, $\overline{AD} \parallel \overline{BC}$, $m(\angle B) = 90°$, AB = 3 cm, BC = 6 cm. and AD = 2 cm
Find the length of $\overline{DC}$ and value of $\cos(\angle BCD)$

Solution:



Draw $\overline{DH} \perp \overline{CB}$

$\therefore HB = DA = 2$ cm

$\Rightarrow CH = 6 - 2 = 4$ cm

$\therefore \triangle DHC$ is right-angled at H

$\therefore (DC)^2 = 4^2 + 3^2 = 25 \Rightarrow DC = \sqrt{25} = 5$ cm

$\cos(\angle BCD) = \frac{4}{5}$

17 If the straight line which is passing through the two points: $(3,0)$ and $(0,a)$ and the straight line whose equation is: $x - y + 1 = 0$ are perpendicular, then find the value of a

Solution

$m_1 = \frac{a-0}{0-3} = \frac{a}{-3}$, $m_2 = \frac{-1}{-1} = 1$

$\because L_1 \perp L_2 \therefore m_1 = \frac{-1}{m_2} \Rightarrow \frac{a}{-3} = \frac{-1}{1} \Rightarrow a = -3 \times -1 = 3$

18 ABCD is a parallelogram, its two diagonals intersects at E where: $A(3,-1)$, $B(6,2)$ and $C(1,7)$ Find the coordinates of the points E and D.

Solution: $A(3,-1)$, $B(6,2)$, $C(1,7)$

$\because$ The two diagonals intersects at E

$\therefore$ E is a midpoint of $\overline{AC}$

$E = \left(\frac{3+1}{2}, \frac{-1+7}{2}\right) = (2,3)$

$\therefore \boxed{D = A + C - B}$ $D = (3,-1) + (1,7) - (6,2)$

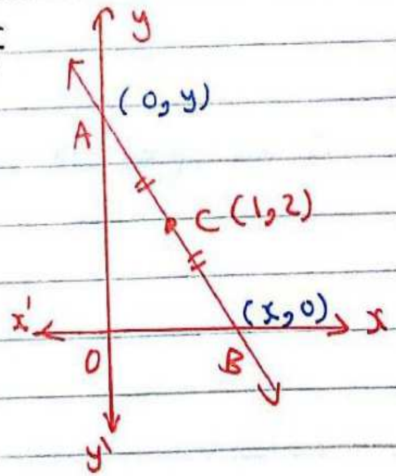
$= (4,6) - (6,2) = (-2,4)$

19 In the opposite figure:

If $C(1,2)$ is the midpoint of $\overline{AB}$, then find:

(1) the coordinates of each of A and B

(2) the area of triangle OAB



Solution:

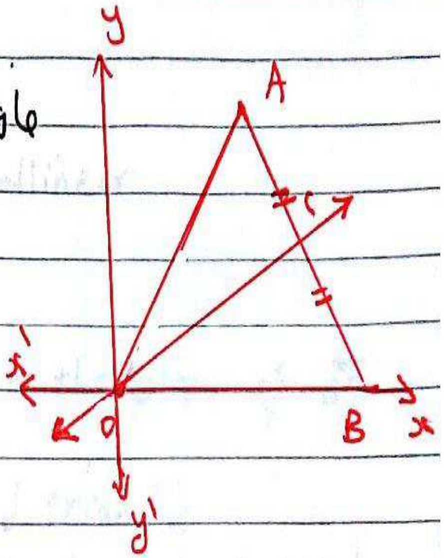
let $A(0,y)$, $B(x,0)$

$\frac{x+0}{2} = 1$, $x = 2$ | $\frac{y+0}{2} = 2$, $y = 4$

$\Rightarrow A(0,4)$, $B(2,0)$

Area of $\triangle OAB = \frac{1}{2} \times 2 \times 4 = 4$ square units

20) In the opposite figure:
ABO in an equilateral triangle
, C is the midpoint of $\overline{AB}$
Find: the equation of the straight line $\overleftrightarrow{OC}$.



Solution:

$\because \triangle ABO$ is an equilateral

$\therefore m(\angle AOB) = 60^\circ$

$\because C$ is midpoint of $\overline{AB}$

$\therefore \overrightarrow{OC}$ bisects $\angle AOB$

$\therefore m(\angle COB) = 30^\circ$

$\therefore m = \tan 30 = \frac{1}{\sqrt{3}}$

$\therefore y = mx + c$

$y = \frac{1}{\sqrt{3}}x + c$

$\because \overleftrightarrow{OC}$ passes through the origin point

$\therefore c = 0$

$\boxed{\therefore y = \frac{1}{\sqrt{3}}x}$

Remarks

to prove that

① A, B and C are collinear

Solution: we prove that

the slope of $\overleftrightarrow{AB}$ = the slope of $\overleftrightarrow{BC}$

② $\triangle ABC$ is right-angled triangle
(where $\overline{AC}$ is the longest side)

Solution:

we prove that: $(AC)^2 = (AB)^2 + (BC)^2$

Area $= \frac{1}{2} AB \times BC$

③ $\triangle ABC$ is acute-angled triangle
(where $\overline{AC}$ is the longest side)

Solution:

we prove that: $(AC)^2 < (AB)^2 + (BC)^2$

④ $\triangle ABC$ is obtuse-angled triangle.
(where $\overline{AC}$ is the longest side)

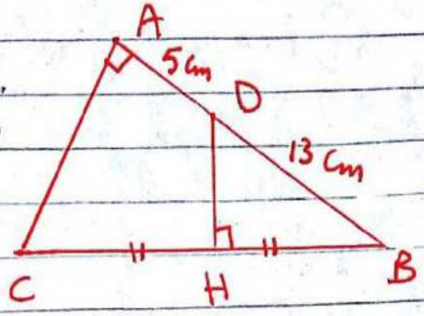
Solution: we prove that:

$(AC)^2 > (AB)^2 + (BC)^2$

to prove that ABCD

ABCD	by using slope	by using distance
parallelogram	① slope of $\overleftrightarrow{AD}$ = slope of $\overleftrightarrow{BC}$ ② slope of $\overleftrightarrow{AB}$ = slope of $\overleftrightarrow{DC}$	① AD = BC ② AB = DC
rectangle: area = AB x BC	first we prove that ABCD is a parallelogram ①, ② ③ slope of $\overleftrightarrow{AB}$ x slope of $\overleftrightarrow{BC}$ = -1	③ AC = BC
rhombus: area = $\frac{1}{2}$ AC x BD	First we prove that ABCD is a parallelogram ①, ② ③ slope of $\overleftrightarrow{AC}$ x slope of $\overleftrightarrow{BD}$ = -1	③ AB = BC
square: area = $(AB)^2$	First we prove that ABCD is a parallelogram ①, ② ③ slope of $\overleftrightarrow{AB}$ x slope of $\overleftrightarrow{BC}$ = -1 ④ slope of $\overleftrightarrow{AC}$ x slope of $\overleftrightarrow{BD}$ = -1	③ AC = BC ④ AB = BC

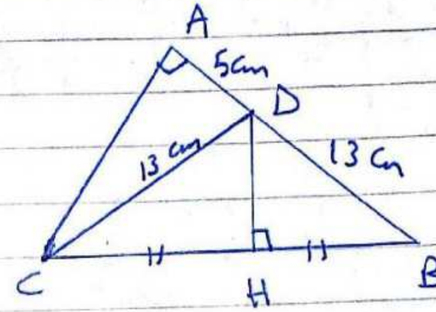
In the opposite figure



$m(\angle A) = 90°$, $\overline{DH} \perp \overline{BC}$ where H is the mid point of $\overline{BC}$, AD = 5 cm, and BD = 13 cm

Find with proof: tan B

Solution



Draw $\overline{CD}$

$\because$ DH $\perp$ CB, CH = HB

$\therefore$ CD = DB = 13 cm

In $\triangle$ ADC:

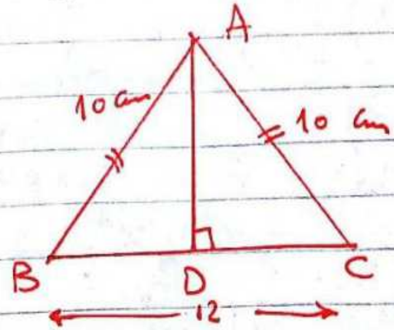
$(AC)^2 = (13)^2 - (5)^2 = 144$

$\therefore$ AC = 12 cm

In $\triangle$ABC: $\therefore \tan B = \frac{AC}{AB} = \frac{12}{18} = \frac{2}{3}$

ABC is a triangle in which AB = AC = 10 cm, $\overline{AD} \perp \overline{BC}$ and cuts it at D, BC = 12 cm, prove: that: $\sin(\angle B) + \cos(\angle C) = 1.4$

Solution:



$\because$ AB = AC and $\overline{AD} \perp \overline{BC}$

$\therefore$ BD = DC = 6 cm

$(AD)^2 = (10)^2 - (6)^2 = 64$

$\therefore AD = \sqrt{64} = 8$ cm

L.H.S $= \frac{8}{10} + \frac{6}{10} = \frac{14}{10} = 1.4$

SECOND: GEOMETRY

Choose the correct answer:

(1) The straight line whose slope $m_1=2$ intersects a straight line in one point, then the slope $m_2 \neq$ ………..

ⓐ 2 ⓑ -2 ⓒ $\frac{1}{2}$ ⓓ $\frac{-1}{2}$

(2) The are of triangle that bounded by the straight lines: $x = 0$, $y = 0$ and $3x-4y=12$ is ……… square unit

ⓐ 4 ⓑ 6 ⓒ 12 ⓓ 10

(3) ABCD is a square in which A(1,0) and B(5,-3), then the perimeter of the square is ……… length unit

ⓐ 5 ⓑ 10 ⓒ 20 ⓓ 15

(4) If C(2,-1) is the midpoint of $\overline{AB}$, A(2,3), then the coordinates of B is ………

ⓐ (1,2) ⓑ (2,1) ⓒ (2,-5) ⓓ (-5,2)

(5) The distance between (0,0) and (3,-4) is ……… length unit.

ⓐ 1 ⓑ 5 ⓒ -1 ⓓ 7

(6) The equation of the straight line passes through (3,5) and parallel to X-axis is ……………………..

ⓐ Y=3 ⓑ X=3 ⓒ Y=5 ⓓ X=5

(7) $\overline{AB}$ is a diameter in the circle M, A(-2,3) and B(6,-5), then the coordinates of M is …………

ⓐ (4,4) ⓑ (-2,1) ⓒ (2,-1) ⓓ (-1,2)

(8) The straight line whose equation: $3x+4y-9=0$ is perpendicular to the straight line whose slope …………

a) $\frac{3}{4}$ b) $\frac{4}{3}$ c) $\frac{-4}{3}$ d) $\frac{-3}{4}$

(9) The distance between the point $(3,-4)$ and the X-axis equals ………… length unit.

a) -3 b) 4 c) -4 d) 3

(10) The straight line whose slope equals to the additive identity is parallel to the straight line whose equation is …………………

a) Y=X b) Y=1 c) X=1 d) Y=-X

(11) If the X-axis bisect $\overline{AB}$ where A(4,2) and B(-2,y), then y=……

a) 3 b) 2 c) -2 d) 4

(12) Two perpendicular straight lines, the slope of the first is $\frac{-1}{4}$ and the slope of the second is 4k, then k = ………

a) 4 b) 1 c) -4 d) $\frac{1}{4}$

(13) If the two straight lines: $x+y=5$ and $kx+2y=0$ are parallel, then k = ………

a) -2 b) -1 c) 1 d) 2

(14) If the straight line whose equation $bx+a=cy$ and passing through the origin, then …… = 0

a) b×c b) c c) b d) a

(15) The straight line whose equation $y=x$ passing through ……

a) (-1,0) b) (0,0) c) (1,0) d) (0,-1)

(16) The slope of the straight line whose equation $cx+ay=b$ is ……

a) $\frac{-a}{b}$ b) $\frac{-a}{c}$ c) $\frac{-b}{c}$ d) $\frac{-c}{a}$

(17) If $\frac{5}{4}$ and $\frac{k}{2}$ are two slopes of two perpendicular straight lines, then k = ………

a $\frac{-5}{8}$ b $\frac{5}{8}$ c $\frac{8}{5}$ d $\frac{-8}{5}$

(18) A circle, its center is the origin point, and its radius length is 3 length units, then the point ………… belongs to the circle.

a (1,3) b $(-2,\sqrt{5})$ c (3,1) d (2,1)

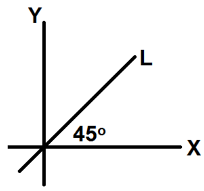
(19) The perpendicular distance between y=3 and y=-2 is …………

a 1 b 2 c 3 d 5

(20) If $\overleftrightarrow{AB}$ // $\overleftrightarrow{CD}$ and the slope of $\overleftrightarrow{AB}$ =-2, then the slope of $\overleftrightarrow{CD}$ is ……

a -2 b $\frac{-1}{2}$ c $\frac{1}{2}$ d undefined

(21) The equation of the straight line L is ……



a X=1 b Y=1 c Y=X d Y=-X

(22) ABCD is a parallelogram, then slope of $\overleftrightarrow{AB}$ = the slope of ……

a $\overleftrightarrow{AD}$ b $\overleftrightarrow{AC}$ c $\overleftrightarrow{BC}$ d $\overleftrightarrow{CD}$

(23) The length of the intercepted part of Y-axis by the straight line 3y=4x-12 equals …………… length unit.

a 3 b -4 c 4 d 12

(24) The circumference of a circle whose center (0,0) and passing through the point (3,4) is …………… length unit.

a 5π b 10π c 4π d 6π

(25) The slope of the straight line which makes an angle of measure θ with the positive direction of X-axis is ....

a $\sin \theta$　　b $\cos \theta$　　c $\tan \theta$　　d $\sin \theta + \theta$

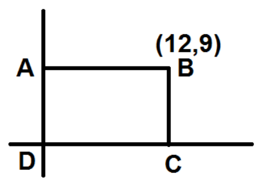
(26) $\overline{AB}$ is a diameter in a circle where A(-1,5) and B(3,1), then the coordinates of the center is ....

a (2,6)　　b (1,3)　　c (4,-4)　　d (-4,4)

(27) The slope of the straight line that parallel to the Y-axis (perpendicular to X-axis) is ....

a 0　　b 1　　c -1　　d undefined

(28) In the opposite figure: ABCD is a rectangle. AD = ... length unit.



a 9　　b 12　　c 13　　d 0

(29) If (0,a) belongs to the straight line $3x-4y+12=0$, then a = ...

a -3　　b 4　　c 3　　d -4

(30) The equation of the straight whose slope is 1 and passing through the origin is ....

a X=1　　b Y=1　　c Y=X　　d Y=-X

(31) The slope of the straight line which makes an angle of measure 45° with the positive direction of X-axis is ....

a 1　　b -1　　c 0　　d 2

(32) If $\overleftrightarrow{AB}$ is parallel to x-axis where A(8,3) and B(2,k), then k=...

a 8　　b 0　　c 3　　d 2

(33) If $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$, A(-1,2) and B(0,0), then the slope of $\overleftrightarrow{CD}$ is ......

a -2　　b $\frac{1}{2}$　　c $\frac{-1}{2}$　　d 2

(34) If the distance between (a,0) and (0,1) is 1 length unit, then a = ...

ⓐ -1 ⓑ 0 ⓒ 1 ⓓ ± 1

(35) If the slope of the straight line ax-y+5=0 is 3, then a = ...

ⓐ 5 ⓑ -5 ⓒ 1 ⓓ 3

(36) The straight line passing through (-1,-1) and (4,4) makes an angle with positive direction of X-axis of measure ....°

ⓐ 30 ⓑ 45 ⓒ 60 ⓓ 135

(37) The slope of the straight line $2y = \frac{1}{2}(3 - 5x)$ is ....

ⓐ $\frac{-5}{2}$ ⓑ $\frac{-5}{4}$ ⓒ $\frac{3}{4}$ ⓓ $\frac{3}{2}$

(38) The straight line 3x+4y=9 is perpendicular to the straight line whose slope is ....

ⓐ $\frac{4}{3}$ ⓑ $\frac{3}{4}$ ⓒ $\frac{-4}{3}$ ⓓ $\frac{-3}{4}$

(39) ABCD is a square and A(2,-5) , B(-1,-1), then its perimeter is .... length unit.

ⓐ 5 ⓑ 20 ⓒ 7 ⓓ 28

(40) If the slopes of two straight lines are equal, then the two straight lines are ....

ⓐ perpendicular ⓑ parallel

ⓒ intersecting ⓓ skew

(41) The length of the Y intercept by the straight line 2x-3y=6 equals .... length unit.

ⓐ -6 ⓑ -2 ⓒ 6 ⓓ 2

(42) The equation of Y-axis is ………………

a X=0 b Y=0 c Y=X d XY=1

(43) The points (-3,0) , (0,3) and (3,0) are vertices of triangle whose type ………….

a scalene b isosceles

c obtuse-angled d isosceles and right-angled

(44) If the slope of a straight line is greater than 0, then the angle with the positive direction of X-axis is …………

a obtuse b acute c right d straight

(45) If the slope of the straight line y+ax+b=0 is -3 and passing through (1,4), then a+b=…………

a 4 b 7 c -4 d -7

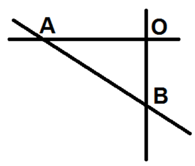
(46) If the slope of the straight line passing through the two points (k,2k+1) and (k-2,4k-1) is 3, then k = …………

a 2 b -2 c 3 d -3

(47) If the straight line y=(a-1)x +5 is parallel to the straight line that passing the two points (1,2) and (3,8), then a = …………

a 3 b 4 c -4 d 7

(48) In the opposite figure: 3 OA = 4 OB, then the equation of $\overleftrightarrow{AB}$ is …………………



a $y = \frac{-3}{4}x + 3$ b $y = \frac{-3}{4}x - 3$

c $y = \frac{-4}{3}x + 3$ d $y = \frac{-4}{3}x - 3$

(49) If the straight line $x-\sqrt{3}y=2$ makes an angle with the positive direction of x-axis of measure $(2k+20)^\circ$, then k = ...

a) 30 b) 20 c) 10 d) 5

(50) If $\sin\theta = \cos 2\theta$ where θ is an acute angle, then θ = ...°

a) 45 b) 30 c) 60 d) 15

(51) $\frac{\sin\theta}{cox\theta}$ = ...

a) 1 b) $\tan\theta$ c) $\sin\theta$ d) $\cos\theta$

(52) ABC is an isosceles triangle and $\tan\left(\frac{A}{2}\right)=1$, then tan B = ...

a) 1 b) $\frac{1}{2}$ c) 2 d) 45°

(53) $\tan\theta \times \cos\theta$ = ...

a) $\cos\theta$ b) $\sin\theta$ c) 1 d) 0

(54) ABC is a right-angled triangle at B and $AB=\frac{1}{2}AC$, then cos A = ...

a) $\frac{1}{2}$ b) $\frac{\sqrt{3}}{2}$ c) $\frac{1}{\sqrt{2}}$ d) $\frac{1}{\sqrt{3}}$

(55) ABC is a triangle where $m(\angle B)=m(\angle A)+m(\angle C)$, then $\tan\frac{B}{2}$ =......

a) 45 b) 1 c) $\frac{1}{2}$ d) $\frac{\sqrt{3}}{2}$

(56) 4 cos 30 tan 60 = ...

a) 3 b) $2\sqrt{3}$ c) 6 d) 12

(57) If $\cos 2\theta = \frac{1}{2}$ where θ is an acute angle, then θ = ...°

a) 15 b) 30 c) 45 d) 60

(58) If $\tan \frac{3x}{2} = 1$ where x is an acute angle, then $m(\angle x) = ...^\circ$

a 10   b 30   c 45   d 60

(59) If $\cos \frac{x}{2} = \frac{\sqrt{3}}{2}$ where x is an acute angle, then sin x = ...

a $\frac{1}{2}$ b $\frac{\sqrt{3}}{2}$ c $\frac{2}{\sqrt{3}}$ d $\frac{1}{\sqrt{3}}$

Essay problems:

(1) If 2 sin x = sin 30° cos 60° + cos 30° sin 60°, find the value of x.

(2) ABC is a right angled triangle at B and 2AB= $\sqrt{3}$ AC, find the trigonometric ratios of ($\angle$A).

(3) If the ratio between two supplementary angles is 3:5, find the measure of each of them.

(4) If sin (2x+20) = cos (x+50), find the value of x.

(5) ABC is a right-angled triangle at C, AB=13 cm, BC=12cm. Prove that: sin A cos B + cos A sin B = 1

(6) Find the equation of a straight line whose slope is 2 and intercepts the positive direction of Y-axis a part of length 7 units.

(7) Find the equation of a straight line whose slope $\frac{-1}{2}$ and passing through the point (3,5).

(8) Find the equation of a straight line which passes through the points (2,3) and (-3,2).

(9) Find the equation of a straight line which passes through the point (3,-5) and parallel to the straight line $x+2y-7=0$

(10) Find the equation of a straight line which passes through the point (1,2) and perpendicular to the straight line which passes through the points (3,2) and (5,-4).

(11) Find the equation of a straight line whose slope equals the slope of the straight line $\frac{y-1}{x} = \frac{1}{3}$ and intercepts the negative direction of Y-axis a part of length 3 units.

(12) Find the equation of a straight line which intercepts the two axes two positive parts of length 4 and 9 respectively.

(13) ABCD is a square in which A(5,4) and C(-1,6). Find the equation of $\overleftrightarrow{BD}$.

(14) ABCD is a rhombus in which A(1,3) and C(6,0). Find the equation of $\overleftrightarrow{BD}$.

(15) Find the equation of the straight line which passes through A(2,3) and B(-1,-3) then prove that $C \in \overleftrightarrow{AB}$ where C(2k+1,4k+1).

(16) ABC is a triangle where A(1,3) , B(5,-2), C(3,4), D is the midpoint of $\overline{AB}$, $\overrightarrow{DE} \,//\, \overleftrightarrow{BC}$ intersects $\overline{AD}$ in E. Find:
(a) the length of $\overline{DE}$. (b) the equation of $\overleftrightarrow{DE}$

(17) The opposite table represents a linear relation:

x	1	2	3
$f(x)$	1	3	a

(a) Find the equation of the straight line.
(b) Find the length of y intercept.
(c) Find the value of a.

(18) If A(-3,4) , B(5,-1) and C(3,5). Find the equation of the straight line which passes through A and the mid point of $\overline{BC}$.

(19) Find the equation of the straight line which passes through the point (3,5) and intercepts a part of the positive direction of X-axis of length 4 units.

(20) Find the equation of line of symmetry of $\overline{XY}$ where X(3,-2) and Y(-5,6).

(21) If the distance between (a,5) and (6,1) is $2\sqrt{5}$, find the value of a.

(22) If A(x,3), B(3,2), C(5,1) and AB=BC, find the value of x.

(23) If C(x,-3) is the midpoint of AB where A(-3,y) and B(9,-7), find the value of x and y.

(24) Prove that A(4,3), B(1,1) and C(-5,-3) are collinear.

(25) If (1,1), (3,5) and (5,a) are collinear, find the value of a.

(26) Prove that the triangle whose vertices are A(5,-5), B(-1,7) and C(15,15) is right-angled at B, then find its area.

(27) Determine the type of Δ ABC according to the length of its sides where A(-2,4), B(3,1) and C(4,5).

(28) If A(5,3), B(6,-2), C(1,-1) and D(0,4). Prove that ABCD is a rhombus and find its area.

(29) ABCD is a parallelogram in which A(3,4), B(2,-1), C(-4,-3). Find the coordinates of D.

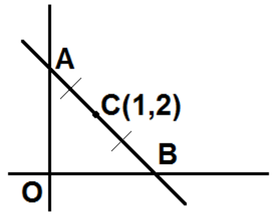
(30) If A(3,-2), B(-5,0), C(8,-9) and D(0,7) prove that ABDC is a parallelogram.

Drawn Problems:

(1) From the opposite figure, Find:

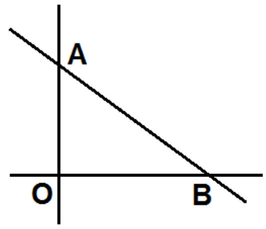
(a) the coordinates of A and B

(b) The area of Δ AOB.

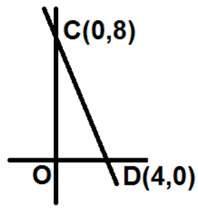


(2) In the opposite figure, if $\overleftrightarrow{AB}$ intercepts Y-axis in the positive direction a part of 3 units and AB = 5 units.

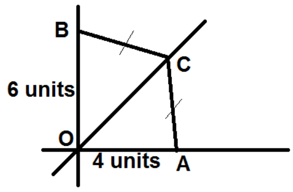
Find: the equation of $\overleftrightarrow{AB}$



(3) The equation of $\overleftrightarrow{AB}$ is CX+Y+D=0, find the value of C and D.



(4) The equation of $\overleftrightarrow{OC}$ is Y=X, find the coordinates of C.



(5) In the opposite figure, if $\tan(\angle ABO) = \frac{4}{3}$,

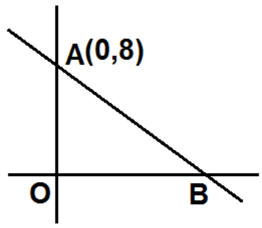
Find:

(a) $m(\angle BAO)$

(b) the coordinates of B

(c) The slope of $\overleftrightarrow{AB}$.

(d) The equation passes through O and perpendicular to $\overleftrightarrow{AB}$

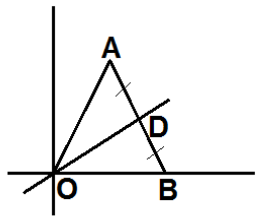


(6) In the opposite figure, ABO is an equilateral triangle, D is the midpoint of AB, Find:

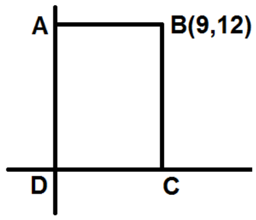
(a) The slope of $\overleftrightarrow{AB}$.

(b) The equation of $\overleftrightarrow{OD}$.

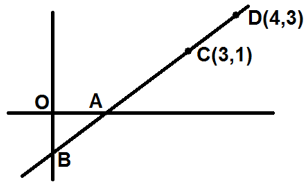
(c) If $(5\sqrt{3}, k) \in \overleftrightarrow{OD}$, find the value of k.



(7) ABCD is a rectangle, find length of $\overline{AD}$.



(8) Find the length of each $\overline{AD}$ and $\overline{OB}$

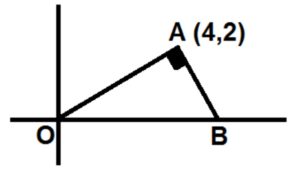


(9) Find:

(a) The coordinates of B.

(b) The equation of $\overleftrightarrow{AB}$.

(c) tan ($\angle ABO$)



(10) From the opposite figure, Find:

(a) The length of $\overline{AB}$.

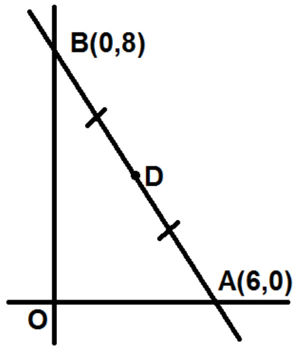
(b) The coordinates of D.

(c) $m(\angle ABO)$.

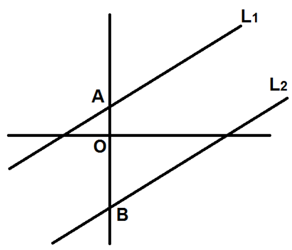
(d) The slope of the perpendicular to $\overleftrightarrow{AB}$.

(e) The equation of the straight which parallel to $\overleftrightarrow{AB}$ and passes through the origin.

(f) sin A cos B + cos A sin B



(11) If $L_1 // L_2$, the equation of L_1 is $y=\frac{2}{3}x+2$ and AB=5 units. Find the equation of L_2.

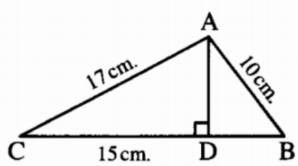


(12) In the opposite figure :

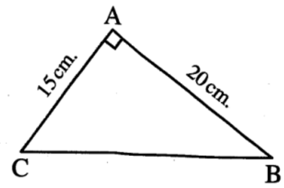
$\overline{AD} \perp \overline{BC}$, AC = 17 cm. , DC = 15 cm. , AB = 10 cm.

Find the value of :

3 tan ($\angle$ C) + sin ($\angle$ B)



(13) **In the opposite figure :**

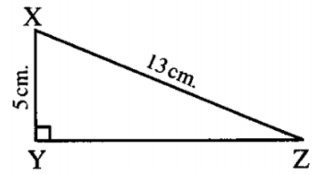


ABC is a triangle in which : m $(\angle A) = 90°$

, $AC = 15$ cm. and $AB = 20$ cm.

Prove that : $\cos C \cos B - \sin C \sin B = \text{zero}$

(14) **In the opposite figure :**



XYZ is a triangle , m $(\angle Y) = 90°$

$XY = 5$ cm. , $XZ = 13$ cm.

Find: $\sin X \cos Z + \cos X \sin Z$

THIRD: ACCUMULATIVE SKILLS GEOMETRY

(1) The sum of measure of accumulative angles at point = ……°

a 90 b 180 c 270 d 360

(2) The sum of measures of interior angles of the pentagon = ……°

a 180 b 360 c 540 d 720

(3) The number of diagonals of the hexagon = …………

a 6 b 3 c 12 d 9

(4) ABC is a triangle in which $m(\angle B) = 3m(\angle A) = 90^{\circ}$, then $m(\angle C)$=…°

a 30 b 45 c 60 d 90

(5) ABCD is a parallelogram $m(\angle A) : m(\angle B)$= 1 : 3, then $m(\angle B)$=…°

a 45 b 135 c 120 d 115

(6) If 3,7,L are lengths of sides of triangle, then L may = ……

a 3 b 4 c 7 d 10

(7) ABC is an isosceles triangle, the lengths of two sides 3cm and 7cm, then the third side may = ……… cm

a 3 b 7 c 4 d 10

(8) ABC is a triangle in which AB=AC and $m(\angle A)$= 60°,then the number of axes of symmetry of this triangle = ………

a 1 b 3 c 0 d 2

(9) The number of axes of symmetry of a circle is ………

a 0 b 1 c 4 d infinite

(10) ABC is a triangle in which $m(\angle B) > m(\angle C)$, then ……………

ⓐ AC-AC<0   ⓑ AC-AB≤0   ⓒ BC≤AB   ⓓ AC>AB

(11) The base angles of the isosceles triangle are …………

ⓐ congruent   ⓑ supplementary

ⓒ equal   ⓓ complementary

(12) The angle of measure ……… supplements an angle of measure 120°.

ⓐ 120   ⓑ 240   ⓒ 60   ⓓ 30

(13) The quadrilateral whose diagonals perpendicular and equal en length is called ………………

ⓐ square   ⓑ rhombus   ⓒ circle   ⓓ rectangle

(14) The volume of a cuboid whose dimensions $\sqrt{2}$, $\sqrt{3}$, $\sqrt{6}$ is …… cm^3

ⓐ $2\sqrt{6}$ ⓑ $3\sqrt{6}$ ⓒ $2\sqrt{3}$ ⓓ 6

(15) The measure of exterior angle of an equilateral triangle is …°

ⓐ 60   ⓑ 80   ⓒ 100   ⓓ 120

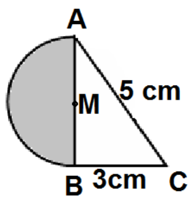
(16) IF $\overline{AB} \equiv \overline{CD}$, then AB – CD = …………

ⓐ 0   ⓑ 1   ⓒ -1   ⓓ 2

(17) The image of the point (-3,7) by reflection in Y-axis is ……

ⓐ (3,7)   ⓑ (-3,-7)   ⓒ (3,-7)   ⓓ (-3,7)

(18) From the opposite figure, the area of the shaded part is ………… cm^2



ⓐ 4π ⓑ 16π ⓒ 2π ⓓ 9π

(19) The opposite figure represents a quarter of a circle of radius length 2cm, then the perimeter of the figure is ………… cm

ⓐ 2π ⓑ 5π ⓒ $\pi+4$ ⓓ $4\pi+4$

(20) In Δ ABC, if $m(\angle C) = m(\angle A) + m(\angle B)$, then ABC is …………

ⓐ acute-angled triangle ⓒ right-angled triangle
ⓑ isosceles triangle ⓓ obtuse-angled triangle

(21) In any triangle ABC, AB + BC – AC > …………

ⓐ 0 ⓑ 1 ⓒ AC ⓓ otherwise

(22) The sum of lengths of any two sides in a triangle is …… the length of the third side.

ⓐ more than ⓑ less than ⓒ equal to ⓓ twice

(23) The type of the angle of measure 108° is ……………

ⓐ right ⓑ obtuse ⓒ acute ⓓ reflex

(24) If ABCD is a parallelogram, then AB + CD = …………

ⓐ 2AC ⓑ 2BC ⓒ 2BD ⓓ 2CD

(25) If ABCD is a parallelogram and $m(\angle A) + m(\angle C) = 150^\circ$, then $m(\angle B) =$ ………$^\circ$

ⓐ 75 ⓑ 30 ⓒ 105 ⓓ 100

(26) Two equal complementary angles, the measure of each of them is …………$^\circ$

ⓐ 50 ⓑ 60 ⓒ 45 ⓓ 30

(27) The length of side opposite to the angle of measure 30° in the right angled triangle equals …… the length of the hypotenuse.

ⓐ 2 ⓑ $\frac{1}{2}$ ⓒ $\frac{1}{3}$ ⓓ $\frac{2}{3}$

(28) In the Δ ABC, if AB > AC, then $m(\angle B)$……… $m(\angle C)$.

a > b < c = d ≡

(29) The concurrence point of medians of triangle divides each median in the ratio …… : …… from the vertex.

a 1:1 b 2:3 c 1:2 d 2:1

(30) The circumference of a circle whose its diameter length 14 cm is ……… cm

a 7 b 22 c 44 d 14

(31) The image of (-4,5) by a translation (2,-3) is ……………

a (-2,-2) b (2,-2) c (2,2) d (-2,2)

(32) ABC is a right-angled triangle at B, AB = 3cm, BC = 4cm, then the area of triangle = ……… cm^2

a 9 b 6 c 12 d 7

(33) If the perimeter of a square is 16 cm, then its area =…… cm^2

a 64 b 16 c 8 d 4

(34) The sum of measure of two supplementary angles = ………°

a 360 b 270 c 180 d 90

(35) Which of the following are sides of a right-angled triangle?

a 3,4,6 b 5,12,13 c 6,8,9 d 9,5,14

(36) The isosceles trapezium has ………… axes of symmetry

a 1 b 2 c 0 d 3

(37) The rhombus (rectangle) has ………… axes of symmetry

a 0 b 1 c 2 d 3

(38) The square has ………… axes of symmetry

a 1 b 2 c 3 d 4

SECOND: GEOMETRY

Choose the correct answer:

1.	A	2.	B	3.	C	4.	C
5.	B	6.	C	7.	C	8.	B
9.	B	10.	B	11.	C	12.	B
13.	D	14.	D	15.	B	16.	D
17.	D	18.	B	19.	D	20.	A
21.	C	22.	D	23.	C	24.	B
25.	C	26.	B	27.	D	28.	A
29.	C	30.	C	31.	A	32.	C
33.	B	34.	B	35.	D	36.	B
37.	B	38.	A	39.	B	40.	B
41.	D	42.	A	43.	D	44.	B
45.	C	46.	B	47.	B	48.	B
49.	D	50.	B	51.	B	52.	A
53.	B	54.	A	55.	B	56.	C
57.	B	58.	B	59.	B		

THIRD: ACCUMULATIVE SKILLS GEOMETRY

1.	D	2.	C	3.	D	4.	C
5.	B	6.	C	7.	B	8.	B
9.	D	10.	D	11.	A	12.	C
13.	A	14.	D	15.	D	16.	A
17.	A	18.	A	19.	C	20.	C
21.	A	22.	A	23.	B	24.	D
25.	C	26.	C	27.	B	28.	B
29.	D	30.	C	31.	D	32.	B
33.	B	34.	C	35.	B	36.	A
37.	C	38.	D				

Complete the following

1. $46° \, 36` \, 24`` = \cdots \ldots \ldots$ in degrees.
2. $44.125° = \cdots \ldots \ldots$ in degrees , minutes , seconds
3. If $\tan\theta = 1.42$ where θ is the measure of an acute angle, then $\theta =$
4. If $\sin\theta = 0.63$ where is the measure of an acute angle, then $\theta = \ldots$
5. If $\sin X = \frac{1}{2}$ where X is an acute angles then $m(\angle x) = \ldots\ldots$
6. If $\cos\frac{x}{2} = \frac{\sqrt{3}}{2}$ where x is an acute angle then $m(\angle x) = \cdots$
7. $\sin 60° + \cos 30° - \tan 60° = \cdots \ldots \ldots$
8. $\cos 60° + \sin 30° - \tan 45° = \cdots \ldots$
9. $2 \sin 30° \text{ x } \cos 60° - \tan 45° =$
10. $\sin^2 30° + \cos^2 30° =$
11. If $\tan(x + 10)° = \sqrt{3}$ where x is an acute angle then $m(\angle x) = \ldots\ldots$
12. If $\tan 3x = \sqrt{3}$ where x is an acute angle, then $m(\angle x) =$

Choose the correct from those given :

(1) $4 \cos 30° \tan 60° =$			
ⓐ 3	ⓑ $2\sqrt{3}$	ⓒ 6	ⓓ 12

(2) $If\ \cos 2x = \frac{1}{2}$ where x is an acute angle, then $m(\angle x) =$			
ⓐ 15°	ⓑ 30°	ⓒ 45°	ⓓ 60°

(3) $If\ \tan \frac{3x}{2} = 1$ where x is an acute angle then $m(\angle x) =$			
ⓐ 10°	ⓑ 30°	ⓒ 45°	ⓓ 60°

(4) $2\tan 45 - \frac{1}{\cos 60} =$			
ⓐ zero	ⓑ $\frac{1}{2}$	ⓒ $\frac{\sqrt{3}}{2}$	ⓓ 1

(5) $If\ \cos \frac{x}{2} = \frac{\sqrt{3}}{2}$ = where x is an acute angle then $\sin x =$			
ⓐ $\frac{1}{2}$	ⓑ $\frac{1}{\sqrt{3}}$	ⓒ $\frac{2}{\sqrt{3}}$	ⓓ $\frac{\sqrt{3}}{2}$

(6) In ΔABC: If $m(\angle A) = 85°$, $\sin B = \cos B$, then $m(\angle C) =$			
ⓐ 30°	ⓑ 45°	ⓒ 50°	ⓓ 60°

Third Essay questions

1 Find the value of each of the following :

(1) (cos 30°- cos 60°) (sin 30° + sin 60°)

(2) $\frac{1}{4}\sin^2 45° \tan^2 60° - \frac{1}{3}\sin 60° \tan^2 30°$

(3) $\sin 45° \cos 45° + \sin 30° \cos 60° - \cos^2 30°$

(4) $\frac{\sin 30° \cos 45° + \cos 30° \sin 45°}{\sin 45° \cos 60° + \cos 45° \sin 60°}$

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2 Prove that :

(1) $\cos 60° = 2\cos^2 30° - 1$

(2) $\tan 60° (1 - \tan^2 30°) = 2\tan 30°$

(3) $\tan^2 60° - \tan^2 45° = 4\sin 30°$

(4) $\tan 60° = \frac{2\tan 30°}{1-\tan^2 30°}$

(5) $\frac{\tan^2 30° \tan 45° \tan 60° + \tan 30° \tan 60°}{\sin^2 60° - \tan 45° \sin 30°} = 8$

3 Find the value of x in each of the following :

(1) $x \cos 30° = \tan 60°$ (2) $x \sin^2 45° - \tan^2 60°$

(3) $4x = \cos^2 30° \tan^2 30° \tan^2 45°$ (4) $x \sin 30° \cos^2 45° = \cos^2 30°$

(5) $x \sin 45° \cos 45° \tan 60° = \tan^2 45° - \cos^2 60°$

(6) $\tan x = \dfrac{\sin 30° \cos 45° + \sin 45° \cos 30°}{\sin 45° \cos 60° + \sin 45° \sin 60°}$ where x is the measure of an acute angle .

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4 Find m $(\angle\theta)$ where θ is an acute angle :

(1) $\sin^2 45° = \cos\theta \tan 30°$ (2) $2\sin\theta = \tan^2 60° - 2\tan 45°$

(2) $\sin\theta = \sin 45° \cos 30° + \cos 45° \sin 30°$

(3) $\sin\theta \sin^2 60° = 3\sin^2 45° \cos^2 45° \cos 60°$

(4) $\tan\theta = 3(\sin 30° + \cos 30°) - 4(\sin^3 60° + \cos 60°)$

(5) $3\tan^2\theta = 4\sin^2 30° + 8\cos^2 60°$

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5 In the opposite figure :

ABCD is a rectangle where AB = 15 cm

AC = 25 cm **Find :**

(1) m ($\angle$ ACB)

(2) The surface area of the rectangle ABCD

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6 In the opposite figure :

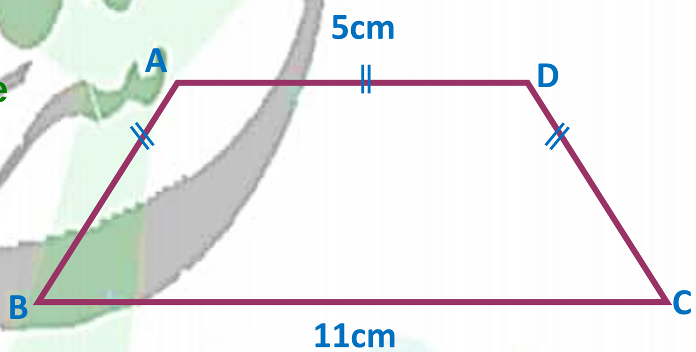
ABCD is an isosceles trapezium where

: AB = AD = DC = 5 cm . BC= 11 cm.

Find :

(1) m ($\angle$B) + m ($\angle$A)

(2) The area of the trapezium ABCD



Choose the correct answer from those given

(1) *The distance between the point* $(4 - 3)$ *and the* $x -$ *axis equals*			
ⓐ -3	ⓑ 3	ⓒ 4	ⓓ 5

(2) A circle of centre at the origin point and its radius length is 2 unit length which of the following points belongs to the circle ?			
ⓐ (1 ,2)	ⓑ (-2 , 1)	ⓒ ($\sqrt{3}$, 1)	ⓓ ($\sqrt{2}$, 1)

(3) If: $(4 - 3)$is the midpoint of AB where A $(3\ ,\ \acute{4})$then the coordinates of B is			
ⓐ (5 , -2)	ⓑ (2 , 5)	ⓒ (5 , 2)	ⓓ (3.5 , - 3.5)

(4) The straight line whose equation is $2\,x - 3\,y - 6 = 0$ intercepts from the $y -$ axis a part of length			
ⓐ - 6	ⓑ - 2	ⓒ $\frac{2}{3}$	ⓓ 2

(5) If the two straight lines: $3\,x - 4y - 3 = 0$ und $kx + 3y - 8 = 0$ are perpendicular then k =			
ⓐ - 4	ⓑ - 3	ⓒ 3	ⓓ 4

(6) If the two straight lines: $x + y = 5$ and $kx + 2y = 0$ are parallel, then k =			
ⓐ - 2	ⓑ - 1	ⓒ 1	ⓓ 2

(7) The area of the triangle bounded by the straight lines: $3x - 4y = 12, x = 0$ and $y = 0$ in square unit equal			
ⓐ 6	ⓑ 7	ⓒ 12	ⓓ 15

(8) $\overline{AB}$ is a straight line passing through the two points $(2\ ,5)$and $(5\ ,2)$ which of the following points ϵ $\overline{AB}$			
ⓐ(1 , 6)	ⓑ (2 , 3)	ⓒ (0 , 0)	ⓓ (3 , -4)

(9) *The points* $(0\ ,-0)$ $(3\ ,0)$ *and* $(0\ ,4)$	
ⓐ form an obtuse-angled triangle.	ⓑ form an acute-angled triangle.
ⓒ form a right-angled triangle.	ⓓ are collinear.

(10) If: A (0 , 0), B (5 + 7)and C (5 + h)are the vertices of a right – angled triangle at C then h =			
ⓐ zero	ⓑ 5	ⓒ 7	ⓓ -5

Essay questions

(1) Find the length of $\overline{MN}$ in each of the following cases :

(1)M (2 , -1) , N (5 , 3) (2) M (-3 , -5) N (5 , 1)

(3)M (7 , -8) N (2 , 4) (4) M (7 , -3) N (0 , 4)

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(2) Find the coordinates of the midpoint of $\overline{AB}$ in each of the following :

(1)A (2 , 4) , B (6 , 0) (2) A (7 , -5) , B (-3 , 5)

(3) A (-3 , 6) , B (3 , -6) (4) A (7 , -6) , B (-1 , 0)

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(3) If C is the midpoint of $\overline{AB}$ find x and y in each of the following cases :

(1)A (1 , 5) B (3 , 7) , C (x , y) (2) A (-3 , y) , B (9 , 11) , C (x , -3)

(2)A (x , -6) , B (9 , -11) , C (-3 , y)

(3)A (x , 3) , B (6 , y) , C (4 , 6)

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(4) Find the slope of the straight line which makes with the positive direction of the X – axis a positive angle of measure:

(1)30° (2) 45° (3) 60°

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(5) Using the calculator find the measure of the positive angle which is made by the straight line whose slope is m with the positive direction of the X-axis in each of the following cases :

(1)m= 0.3673 (2) m = 1.0246 (3) m = 3.1648

6 Prove that the points: A (3 , -1) , B (-4 , 6) , C (2 , -2) which belong to an orthogonal cartesian coordinates plane lie on the circle whose centre M (-1 , 2) , then find the circumference of the circle.

---

7 Find the value of a in each of the following :

(1) If the distance between the two points (a , 7) and (-2 , 3) equals 5

(2) If the distance between the two points (a , 7) and (3 a , -1 , -5) equals 13

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8 If : A (x , 3) , B (3 , 2) , C (5 , 1) and if AB = BC find the value of x

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9 If the points (0 , 1) , (a , 3) , (2 , 5) are collinear find the value of a

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10 If the distance between the point (x , 5) and the point (6 , 1) equals $2\sqrt{5}$, find the value of x

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11 In which of the following cases , the points A , B and C are collinear ? Explain your answer.

(1) A (-1 , 5) , B (0 , -3) , C (2 , 1)

(2) A (-2 , 1) B (2 , 3) , C (4 , 4)

(3) A (0 , 2) B (4 , 8) , C (6 ,11)

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12 Identify the type of the triangle whose vertices are A (-2 , 4) , B (3 , -1) , C (4 , 5) due to its sides lengths.

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13 Prove that triangle whose vertices A (5 , -5) , B (-1 , 7) , C (15 , 15) is right angled at B , then calculate its area.

14. Prove that the points: (5 , 3) , (6 , -2) , (1 , -1) , (0 , 4) are vertices of a rhombus then find its area.

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15. Prove that the points : A (- 2 , 5) , B (3 , 3) , C (-4 , 2) are not collinear and if D (-9 , 4) prove that the figure ABCD is a parallelogram

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16. Let A (5 , -6) , B (3 , 7) and C (1 , -3) , find the equation of the straight line which passes through A and the midpoint of $\overline{BC}$

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17. Find the equation of the straight line passing through the point (3 , -5) and parallel to the straight line: x + 2y – 7 = 0

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18. Find the equation of the straight line which intercepts the two axes two positive parts of lengths 4 and 9 for x and y – axis respectively.

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19. If : A (1 , -6) , B (9 , 2) find the coordinates of the points which divide $\overline{AB}$ into four equal parts in length.

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20. Prove that the points : A (6 , 0) , B (2 , -4) and C(-4 , 2) are vertices of a right-angled triangle at B , then find the coordinates of the point D which makes the figure ABCD a rectangle.

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21. If the points: A (3 , 2) , B (4 , -3) , C (-1 , -2) , D (-2 , 3) are vertices of a rhombus find :

(1) The coordinates of the point of intersection of its two diagonals.

(2) The area of the rhombus ABCD

22 If: A (-1 , -1) , B (2 , 3) , C (6 , 0) , D (3 , -4) are four points on an orthogonal cartesian coordinates plane. Prove that $\overline{AC}$ and $\overline{BD}$ bisect each other. What is the name of this figure ?

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23 ABCD is a parallelogram where A (3 , 4) , B (2 , -1) , C (-4 , -3) , find the coordinates of point D , then find the coordinates of point E such that the figure ABCE becomes a trapezium in which $\overline{AE}$ // $\overline{BC}$, AE = 2 BC

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24 If the straight line L_1 passes through the two points (3 , 1) and (2 , k) , and the straight line L_2 makes with the positive direction of the X-axis a positive angle of measure 45 , find the value of k if :

(1) $L_1 // L_2$ (2) $L_1 \perp L_2$

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25 Using the slope prove that the points : A (-1 , 3) , B (5 , 1) C (6 , 4) , D (0 , 6) are vertices of a rectangle.